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THE
Handy Book on
Pruning
Grafting
— AND —
Budding

By JAMES UDALE

(Chief Horticultural Instructor for
Worcestershire)

— WITH INTRODUCTION BY —
THE RIGHT HON. VISCOUNT COBHAM

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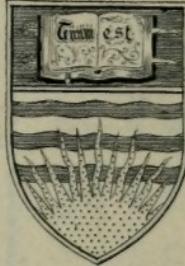
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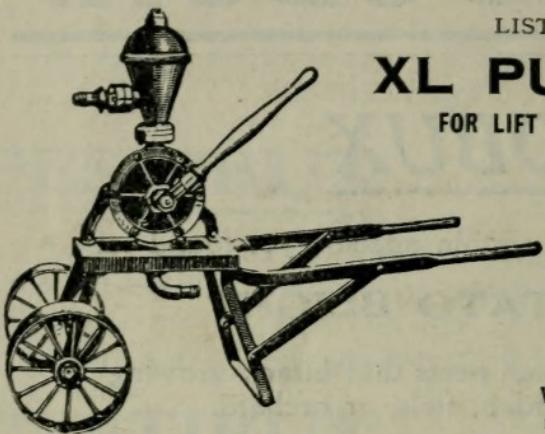
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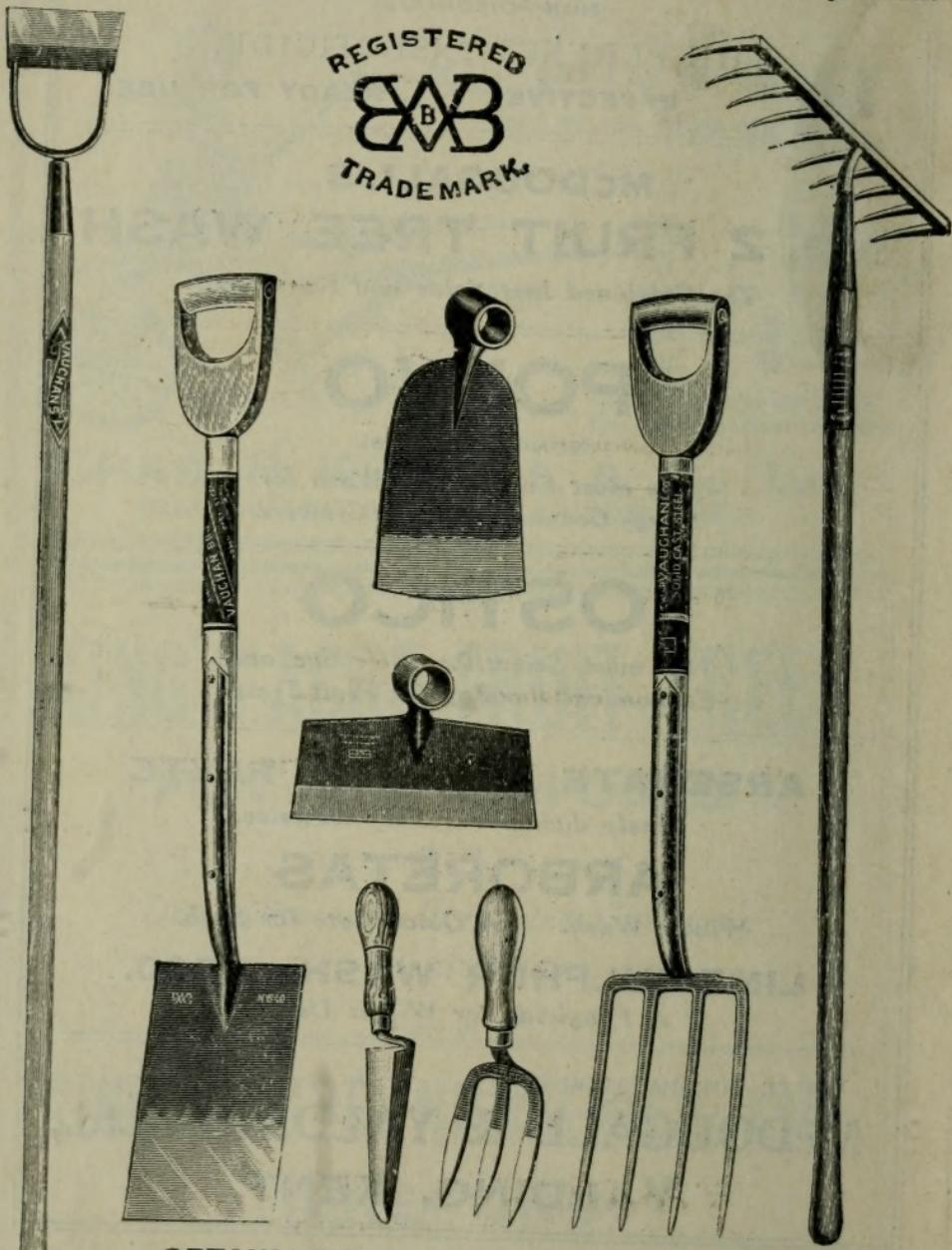
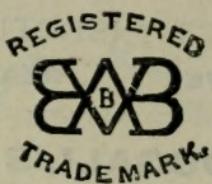
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The Handy Book on Pruning, Grafting and Budding

BY JAMES UDALE

(Chief Horticultural Instructor
for Worcestershire since 1891)

Author of "Chrysanthemums—Their History and Cultivation,"
"Gardening for All," "Practical Hints on Vegetable Farming,"
"The Handy Book on Pruning," and "The Handy Book on
Pruning, Grafting and Budding."

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AUTHOR'S NOTE TO THE
FIFTH EDITION.



THE continued appreciation of the modest effort to promote a better and wider knowledge of Pruning, etc., is most encouraging; and in presenting to the public the Fifth Edition—which has been revised and enlarged—it is hoped that it may serve as a text book, be received with undiminished favour, and continue to give unmeasured pleasure and satisfaction.

J.U.

December, 1921.

To

THE REVEREND F. R. LAWSON,

RECTOR OF FLADBURY

(FORMERLY VICAR OF CLENT AND OF PERSHORE).

AND

LATE CHAIRMAN OF THE HORTICULTURAL

INSTRUCTION COMMITTEE FOR

THE COUNTY OF WORCESTER.

TO WHOSE WISE COUNSEL AND DIRECTION FOR MANY YEARS

THE SUCCESSFUL HORTICULTURAL INSTRUCTION GIVEN IN

THE COUNTY WAS LARGELY DUE.

AND FROM WHOM THE AUTHOR HAS AT ALL TIMES

RECEIVED MUCH KINDNESS AND HELPFUL GUIDANCE.

THIS BOOK IS.

WITH KIND PERMISSION

RESPECTFULLY DEDICATED.

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INTRODUCTION
TO THE FIRST EDITION, PUBLISHED IN 1905.

MR. UDALE scarcely requires an introduction to the gardening public. He is well known as the chief Horticultural Instructor for Worcestershire since 1891, and the author of many works and reports on the cultivation of flowers, fruit and vegetables. . . . As regards the management of allotments and cottage gardens, Mr. Udale's work may be said to have been that of a pioneer, and after so many years of lecturing, demonstrations and visits to some thousands of gardens, his experience must be regarded as unrivalled, and his authority beyond question.

The present work deals with a branch of horticulture which is often imperfectly understood, although a thorough knowledge of it is absolutely essential to success. . . . No operation is less speculative in its results than good pruning, or more quickly and certainly productive of good results, enhancing not only the profits but the pleasure of horticulture. On the other hand, unskilled pruning or neglect of pruning causes mischief that cannot be repaired, and undoubtedly

reduces the annual produce of orchards and cottage gardens to a degree which must in many cases extinguish all chance of profit. For it cannot be too strongly insisted upon in these days of keen competition and low prices, that profit from the cultivation of the land is not to be expected unless both industry and skill are employed. . . . Skill, undoubtedly, can be acquired by practice and experience, and cannot be perfected without them. But to learn from one's own mistakes is an expensive process, especially in the department of pruning, where one mistake may effect the productiveness of a valuable tree for the rest of its life. The fewer mistakes, therefore, the better, and it is with this truth in mind that this little book is written, for the benefit chiefly, but not exclusively, of beginners, amateurs and untrained gardeners, and I recommend it most cordially to their attention.

COBHAM.



Standard Apple Tree, 'Maltster,' in the
Experimental Garden, Droitwich.

CHAPTER I.

THE PRINCIPLES OF PRUNING.

“**I**T is impossible to instruct any person in pruning by merely showing him how to do the work on a given plant; for the very next plant may present a new set of problems,” says L. H. Bailey in “The Pruning Book.” How true is that statement all teachers of Pruning well know. Professor Bailey further says: “Of all the operations connected with the growing of trees and shrubs, pruning and training bring the person into closest contact *and sympathy with the plant.*” The italics are mine. In those italicised words we have one of the secrets of success in all plant culture generally, as well as in pruning.

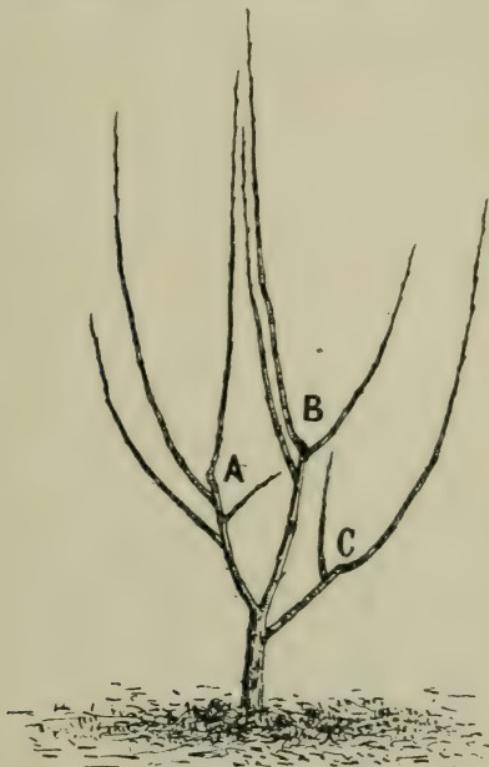
In the following pages I hope to make easier the path of the pruner, and to give to him light where at present there is darkness. And although this small effort at education in pruning fruit trees is mainly intended for the cottage gardener and the amateur, yet it may also furnish hints for the help and guidance of those more advanced in the art.

There are various reasons for pruning fruit trees, among which are the following:—

1. To promote the production of more growth.
2. To induce a tree to grow in a certain form.
3. To remove superfluous wood and injured part.
4. To restrict a tree to a certain space.
5. To produce more and better fruit.
6. To admit light and air to leaves and fruit.

THE PRODUCTION OF WOOD.

The first object at which we aim when pruning a young tree is that of the production of wood, and we adopt means to induce it to grow vigorously. But there is some difference of opinion as to the right time for pruning recently-planted fruit trees.



Apple, 'Early Rivers.'
Grafted on Apple Stock, April, 1900.
Pruned at A B C, February, 1901.

From a Photograph.

Some gardeners prune the trees almost as soon as they are planted, no matter when that may be. Others wait until the sap is in circulation and the buds become plump, and even bursting into growth. There are other

gardeners who leave the trees unpruned for a year and then prune them severely, *i.e.*, back into old wood of two or three years' growth.

In the first case injury sometimes occurs because the operator has not been able to select the strong buds from the weak, and he has cut back to an imperfect bud. The usual result is weak and unsatisfactory growth; and sometimes the death of the tree.

Those who leave the trees unpruned for a year and then cut to old wood, lose a year's growth. In this case the practitioners claim that the trees grow so vigorously during the second year, that the amount of wood obtained



Apple, 'Early Rivers.'
Grafted on Apple Stock, April, 1900.
Shewing its rate of growth at the end of 1902.
From a Photograph.

more than balance the loss of growth during the first year. This claim, in my opinion, and according to my experience and observation, is not substantiated; although I think the trees make good growth, and I have seen many acres so treated since 1891.

The "happy mean" is in this, as in many other practices and affairs of life, the best; and this is practised by those who defer pruning until the sap is in circulation.



Apple, 'Early Rivers'
Grafted on Apple Stock, April, 1900.
Shewing the tree at the end of 1903.

From a Photograph

and the buds swelling and expanding in due season after the trees are planted. Cultivators who adopt this system of pruning newly-planted young trees, commence the operation at the time when almost every bud exhibits the measure of its vitality and its capacity for producing a strong growth under suitable conditions.

Having selected the best and rightly placed bud, the shoot should be cut away just above that bud; and by doing this the number of subsequent shoots or branches are fewer than they would have been, more food is available for them, and there is luxuriant growth as the result. If the tree possessed three branches before being pruned, it will have six to nine at the end of the first season, two, three, or four feet in length; and correspondingly increased growth—as much as three, five, or eight feet, in case of certain varieties of Plums—during the second year of growth.*

This practice and principle of pruning avoids the defects of the first and third periods mentioned, and combines the good qualities of the three.

Professor Bailey mentions the following points in regard to pruning for the production of wood, and I think nearly all experienced pruners will agree with him:—

1. “Heavy pruning of the top of a plant tends to increase the production of wood.”
2. “Heavy pruning of the top tends to rejuvenate weak or declining plants.”
3. “A pruned plant tends to resume its natural habit.”

* Trees which have lost nearly all their roots from any cause; or which are transferred from warm and dry soil to wet and cold soil may frequently be better for being left un-pruned for a season until they have recovered their root system and free circulation of sap.



Apple, 'Early Rivers.'
Grafted on Apple Stock, April, 1900.
Showing the tree at the end of 1904.

From a Photograph.

PRUNING FOR FORM.

Our second object is to make a tree grow to the desired form. This the expert pruner can do according to his pleasure. Generally, any given tree can be made to grow in any desired form, within certain limitations; the process will be easy or difficult to accomplish in proportion to the natural habit of the individual tree. The stock will exercise a special influence over fruit trees. But whether the tree is to be a standard, half-standard, pyramid, bush, cordon, espalier, fan-trained, or palmette-verrier, each form is given to the tree by the proper use of the knife. Having decided upon the form the tree is desired to take, we commence with the proper style of pruning and build up the tree from year to year until it is furnished with the requisite number of main branches—and secondary branches in some cases—to form the perfect tree.

Our third object is to remove superfluous wood and injured part of a tree. This consists of cutting out a misplaced or crossing branch, any branch for which there is not sufficient space in which it can amply expose its leaves to the very necessary influence of light and air, and any branch rubbing against another to their mutual detriment. Also the removal of dead and dying branches, diseased growth, dead "snags," and any other unhealthy and injurious part.

PRUNING FOR RESTRICTION

is at once very easy and very difficult. It is easy to cut the branches back annually to a certain point, and at the same time to render a tree incapable of bearing fruit, and very ugly and objectionable. It is difficult to

give the necessary amount of pruning and at the same time prevent overcrowding of shoots and spurs; but it can be accomplished. The method will vary with the nature of the tree under operation, but usually the treatment will come under one of two heads: Either to cut back to a young shoot at the point of limit nearer the stem, as in the case of the Peach, Nectarine, and Apricot; or to cut to a spur at the point of limit and to thin out the shoots and subsequent spurs, as in the case of Apples, Pears and Plums; and sometimes a modification of both methods will best meet the requirements of the latter fruits.

TO PRODUCE MORE AND BETTER FRUIT

is our fifth and very important object in pruning fruit trees; and the sixth and most important object is to admit light and air to all the leaves and fruit, because a deficiency of either air or light is always injurious to the welfare of a growing tree.

1. A tree must be perfectly healthy to be able to produce the largest amount of fruit for the longest period of time.
2. The health of a tree depends upon the adequate supply of available food, air and light.
3. The tree must be able to properly utilize the perfect food, light and air.
4. It should receive suitable climatic conditions in regard to heat, water and shelter, and be protected from injury by animals, insect and fungoid pests.

With regard to the first condition we well know that an unhealthy tree—from whatever cause—is often very fruitful; but we also know that the fruit from such

tree, when growing under normal conditions in other respects, is often inferior in quality, and the tree is comparatively short lived; therefore such tree does not comply with the first condition.

The second condition is not complied with when a tree is deprived of food by adjacent trees; or of light and air by trees and buildings near to them; or when



Apple, 'Early Rivers.'
Grafted on Apple Stock, April, 1900.
After being pruned in March, 1905.

From a Photograph.

the soil is deficient in available food, or water to dissolve and dilute it sufficiently to freely enter the root-hairs and outer-cells.



Apple, 'Reinette Van Mons,' to shew the effects of non-pruning. Branches too crowded, and the fruit small in quantity and inferior in quality.

Planted 1896 in the Experimental Garden, Droitwich.

From a Photograph.

The third condition is helped or hindered by proper pruning or by non-pruning. Apples, Pears, Plums and Currants in the Experimental Garden, Droitwich, annually demonstrate that unpruned trees are the most fruitful for a few years; after which the properly pruned trees rapidly overtake and surpass them, and the fruit is at all times larger and better in all respects, and realises considerably better prices when sold.

The fourth condition is absent when fruit trees are planted without shelter at the top of a hill; and without protection from animals or left to the ravages of insect foes, and the not less destructive effects of mildew, canker, moss and lichen.

CHAPTER II.

THE PRACTICE OF PRUNING.

IN pruning a tree for the purpose of promoting the production of fruit, the operator must remember the substance, and understand the true significance of the principles previously mentioned.

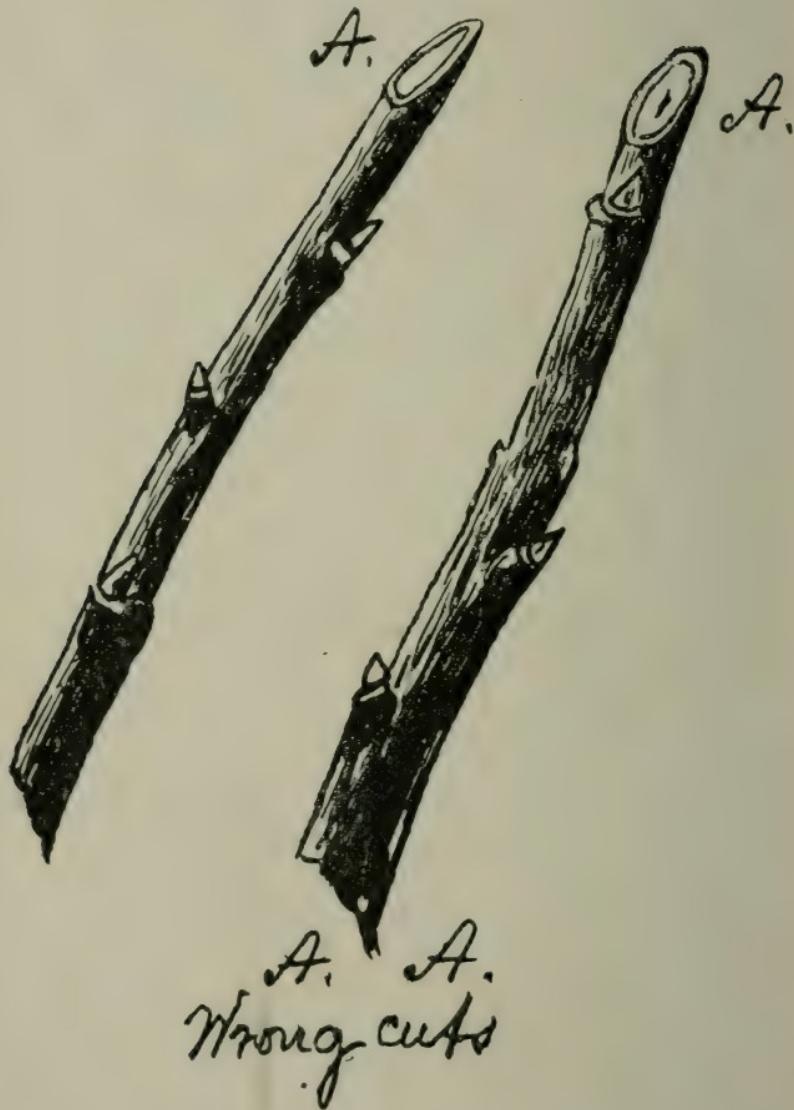
The good pruner first aims at building up a tree and rendering it capable of bearing (without serious injury to itself) large crops of fine fruit in future years; to do this he should prune almost entirely for the production of wood during the first four or five years of the life of the tree. And although he does this, many varieties of trees will produce fruit in the second or third year; others are not so precocious.

Many persons are too anxious to obtain fruit from young trees, the result being premature weakness, stunted growth, and a poorly developed specimen of its kind. Moreover, the total amount of fruit it produces during its shortened and unhealthy life is below the normal and the quality is inferior.

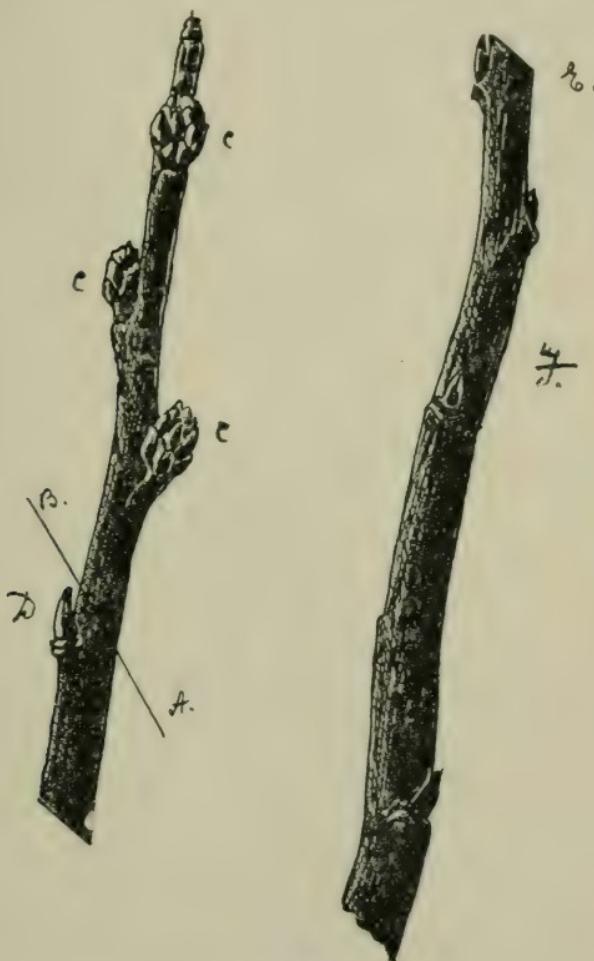
Much depends upon the way the cuts are made when pruning, the length of wood to be left, and the bud to be selected for the production of the leading branch and of its subsequent continuation.

Some pruners have a fixed idea that every young shoot (or preceding year's growth) upon each tree should be cut in such a manner that a certain number of inches of wood are left; and they usually think that it is quite immaterial as to the exact point at which the shoot should

Plum : Cyar.



be severed or in what direction. Others use more correct judgment in regard to the amount of the young wood to be removed; but they also make the cuts wrongly, and leave wounds that do not so quickly heal as the vigour of the trees renders them capable of healing, or cover-



C C C are flower-buds of a Pear tree.

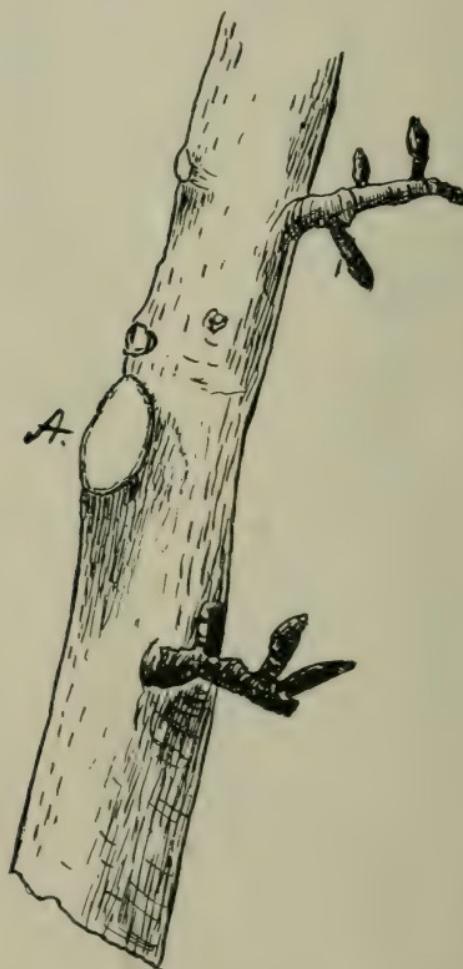
D is a wood-bud.

A and B is the line of direction for pruning.

F is the shoot after pruning ; the cut having been made at E.

ing with new tissue. Others err through faint-heartedness and do not prune sufficiently.

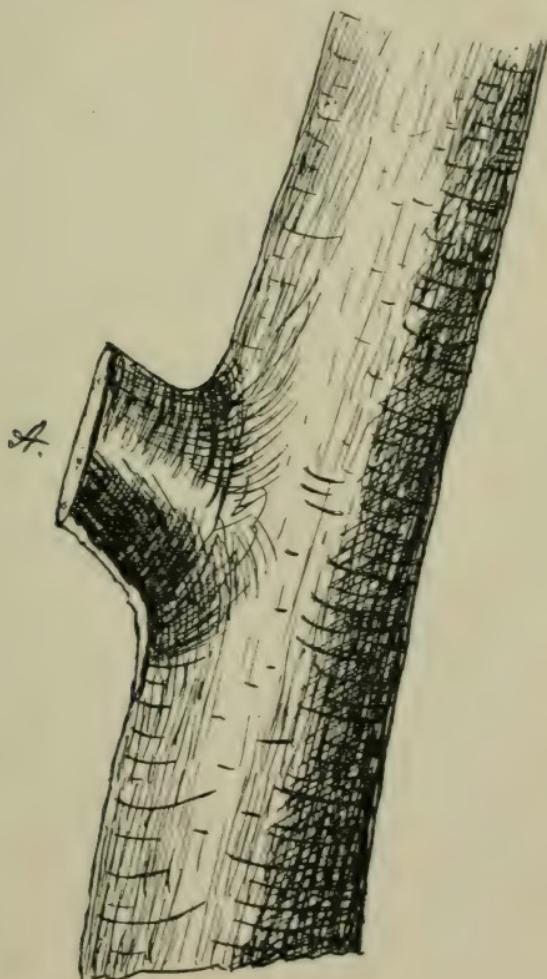
Each tree—no matter what kind, or variety of the same kind—must be dealt with on its own merit, though the same rules of pruning apply equally to all.



Pear, 'Winter Nelis,' shewing where a branch has been properly cut away at A. *Right Pruning.*

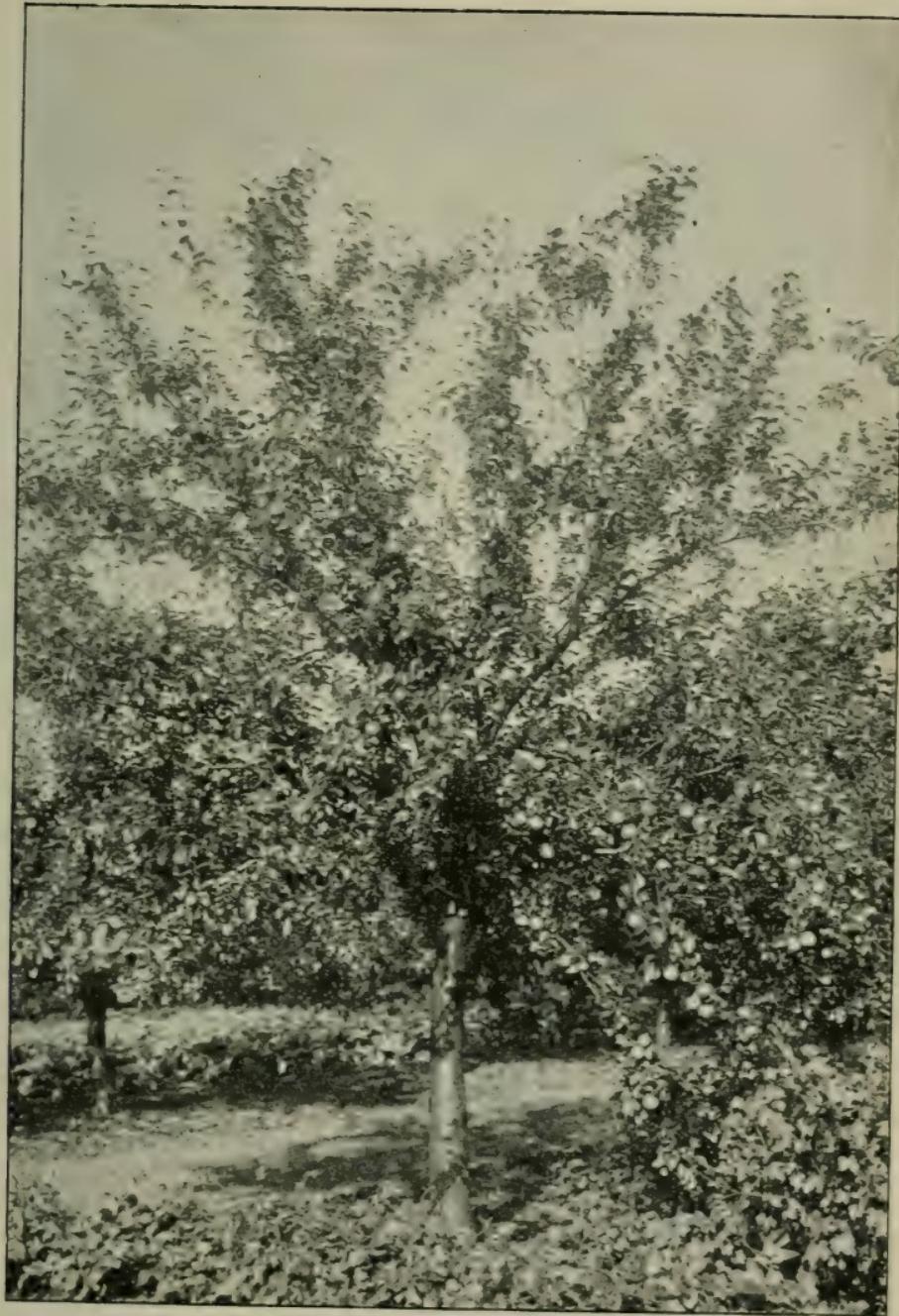
The following rules may be helpful to the reader:—

1. Cut back one-year-old wood to a bud pointing in the direction in which the subsequent shoot is desired grow.
2. All branches should be severed close to the branch or stem from which they grow, when they have to be entirely removed.



Shewing a bad and "spawled" cut at A.
Wrong Pruning.

3. In cutting a branch one year old down to a wood bud, insert the edge of the knife behind, and about one-twelfth of an inch above the bud, and bring it out in front and slightly above the bud.
4. The angle of every wound, large or small, should be an obtuse or nearly right angle, in order that the surface of the wound may not retain moisture.
5. In all cases, when cutting to a bud care should be taken to cut to a *wood* bud and not a fruit bud, if it is desired to extend the branch at that point.
6. Every wound should have a perfectly smooth surface; and large wounds should be painted.
7. When amputating a branch by means of a saw, always first cut the *under* side of the branch, then proceed with the sawing at the top side of the branch, by this method of procedure "spawling" or tearing of the stem (or branch) downwards will be prevented.
8. All large wounds should be painted over or dressed with creosote or Stockholm tar, or other preservative, such as paint, tar, etc.



Standard Apple Tree, 'Beauty of Kent,' in the Experimental Garden,
Droitwich. Planted 1896.
Photograph 1908. Crop 198 lbs.
Crop in 1912 ... 448 lbs.

CHAPTER III.

THE APPLE.

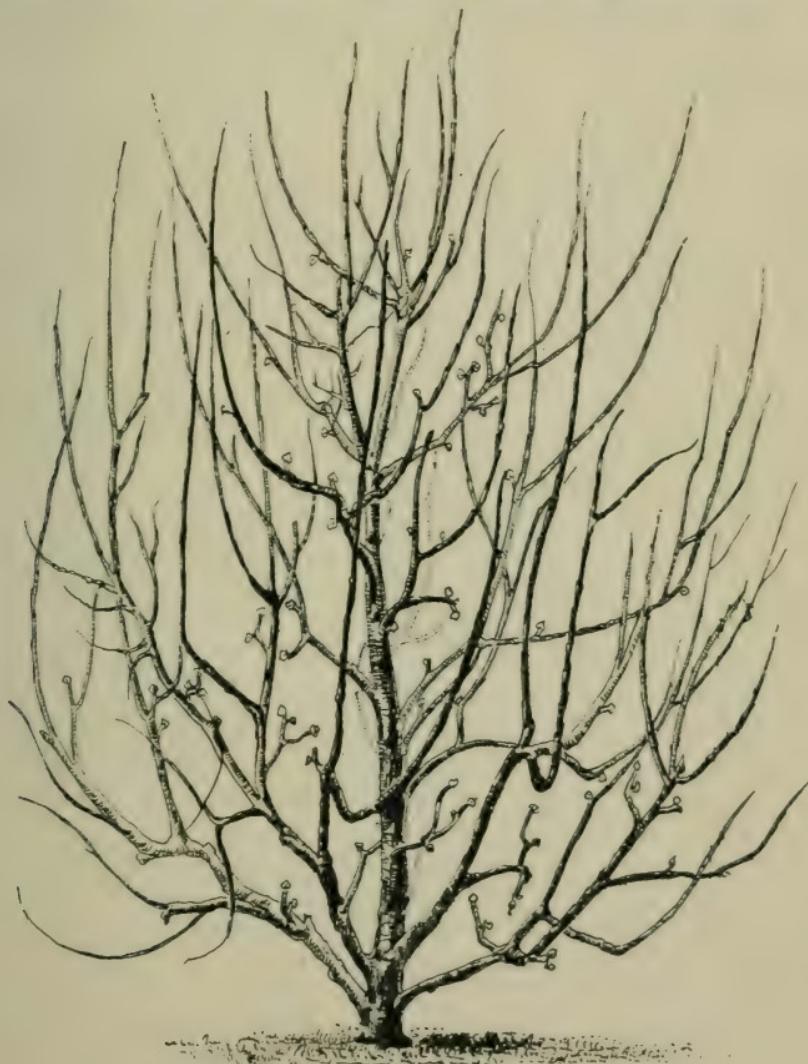
THE Apple tree is usually grown as a standard, pyramid, bush, espalier, and cordon; sometimes it is trained as a goblet and grid-iron. It is the principal hardy fruit of the British Isles, and is cultivated largely as a standard tree. Although the bulk of our home-grown supply is derived from standard trees, I think it is indisputable that the best apples are produced by dwarf trees.

Apple trees grown as large standards in orchards and gardens, should be boldly pruned during their early years of growth, after being planted where they are intended to remain for life.

In nearly all cases it is correct procedure to cut out the central shoots. A tree which appears to be inadequately furnished with branches at two years after planting, is often overcrowded with branches after a lapse of four years; hence the necessity for the apparently extreme pruning in the earlier years of its life. Moreover, neglected or inadequately-pruned young trees become out of balance—which is detrimental to their vigour—as well as crowded, and the fruit they produce is frequently deficient in size and colour.

FIRST YEAR'S PRUNING.

In proceeding to prune a young standard tree, and having regard to what has been previously advised as to deferring the operation until the sap is in circulation, first remove the central branch, then cut clean away any



Bush Apple, 'Lord Grosvenor.'
Four years after planting.

weak secondary shoots from among the restraining branches, and any other branch which may be superfluous. The branches that remain will then radiate from the centre and at equal distance from each other.

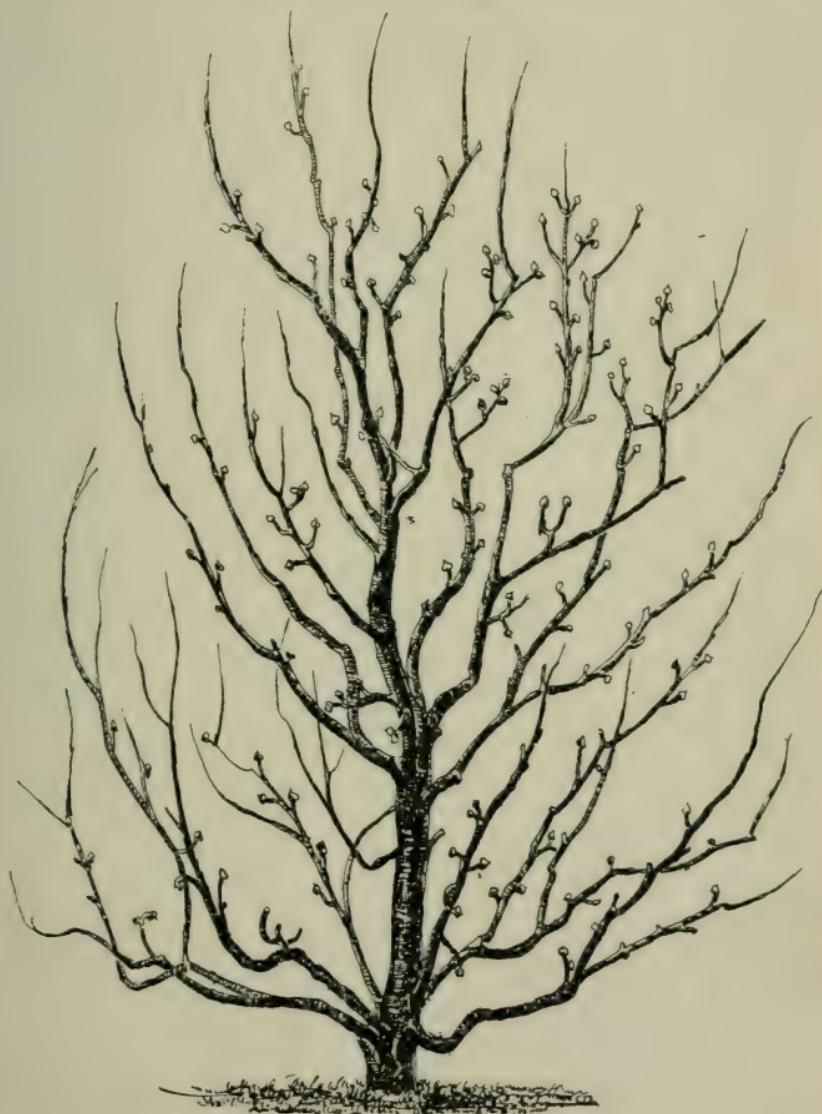
Now prune those branches to a strong wood-bud on the leading shoot; and that bud must be on the side of the shoot *which faces in the direction in which the branch should be continued*, in order to form a well-shaped and well-balanced tree. Prune each young branch in the same manner, and thus form a good framework for the tree. Each of the branches will not be exactly of the same length after they are pruned if they have been properly pruned; and perhaps it may even look more irregular and ill-balanced than it did before being pruned, they often do, but the subsequent growth soon produces an even balance.

As the Spring advances and growth becomes active, some very small and weak growth will manifest itself on the lower part of the branches and near the centre of the tree. These growths should be entirely removed by the hand, or finger and thumb. They are useless, and even injurious. If they are not easily removed by finger and thumb, they should be removed by the aid of a sharp knife; and these worthless growths should be removed as frequently as they re-appear.

SECOND YEAR'S PRUNING.

The tree will now be furnished with six to nine good branches, and some secondary branches which are not required for the formation or building of the tree. There will also be some small shoots near the base of

the main branches; these may be cut back to two buds for the purpose of forming fruit-spurs, and be allowed to bear fruit during the third year after planting.



Bush Apple, 'Ecklinville Seedling.'
Four years after planting.

Secondary branches, to which I have alluded, should be cut away in the manner described in Rule 2; but if there is space about there for a fruit-spur, it may be cut back according to Rule 3. Usually it is better to keep the lowest parts of the branches of standard trees of Apples and Pears quite clear of small growth or spurs; but occasionally, and with certain varieties, an exception may be made to that procedure.

It now remains to again shorten the main branches with a view to (a) their further extension in the right direction, and to strengthen them; and (b) to promote the production of one or more furnishing branches to fill spaces that require filling in order to form a perfect tree.

Each leading shoot or branch should be pruned according to its own strength, and cut down to the best bud as at the first year's pruning; usually the space or length of wood between that bud and the point of severance the preceding year will be found to be several inches longer than that which was left at the first year's pruning.

THIRD YEAR'S PRUNING

Standard fruit trees are either "made or marred" during the first three or four years after they are planted in their permanent positions. If badly pruned, or not pruned during that period, the evil is not likely to be entirely removed at any subsequent time.

At the third annual winter pruning the pruner will be able to give the finishing touches to the outlines of nearly all the trees which he has attempted to form



Standard Apple, 'Maltster.'
Four years after planting.

and fashion. A few trees, owing to their natural habit are not so amenable to general treatment as the others and to them must be given a little more time and attention. Perhaps they are slender in habit (long and thin wood), or very erect and dense. Scarlet Crofton is a representative of the former, and Gloria Mundi of the latter. Scarlet Crofton requires to have the main branches shortened more severely for a longer period, accompanied by judicious thinning-out where the slender shoots are too numerous. Gloria Mundi must have the central branches removed time after time, and the remaining branches considerably shortened just as often in order to obtain a tree sufficiently open in centre and the branches spreading, thus producing a tree of medium breadth with nicely separated branches, instead of a very narrow and dense tree.

In pruning the majority of the trees the third year there will not be so many branches requiring removal. Probably one or more secondary branches are growing towards the centre of the tree; they must be cut cleanly away. Several of the same kind are almost certain to be found among the permanent branches, and they must be removed, unless any of them are required to fill a space which could not be filled before, and thus become a main branch. Small shoots may be shortened to one or two buds for the formation of fruit spurs where they are required; others should be entirely removed.

The leading shoots of the main branches may, or may not, be better for shortening more or less; this must be left to the judgment of the pruner, who will be guided by his knowledge of the natural habit of the variety of



Standard Apple, 'Gloria Mundi,' with very erect habit of growth,
To shew the necessity of cutting back the main branches, and of keeping
an open centre with that variety, and other varieties of a similar habit.
Planted in 1896 in the Experimental Garden, Droitwich.

From a Photograph.

the tree. A very robust variety may not require to be again shortened. A less strong-growing variety will, perhaps, be better for having one-third the length of the shoot removed. And a rather weak-growing variety will be better for having its leading shoots cut back half their length; but the tree should be pruned if the pruner has any doubt about it.

Pruning in subsequent years will consist of a modification of the pruning previously described, viz.:—The judicious removal of a superfluous, misplaced, or crossing branch; shortening or entire removal of secondary or small branches; attention to the leading shoot in the matter of shortening or of allowing it to remain unshortened; and the removal of dead parts.

Care must be taken in all cases to cut to a bud pointing in the direction in which the subsequent shoot is desired to grow.

A word of warning should here be given about the peculiar habit of certain varieties of Apples to produce fruit, almost exclusively, at the end of short branches—branches from four to ten or twelve inches long; therefore, if these branches be pruned in the usual manner, the fruit-bearing part will be cut away. The following varieties are a few of those which have the above nature: Irish Peach, Scarlet Crofton (Crofton Scarlet), Maltster, The Queen, Grand Duke Constantine, and Baumann's Red Reinette. And in a less degree:—Worcester Pearmain, Ecklinville Seedling, Bismarck, and New Hawthonden.

PRUNING BUSH OR PYRAMIDAL APPLE TREES.

A pyramidal tree usually has a central leading branch. This central branch or stem is annually shortened to a suitable bud, and as the subsequent growth from that bud extends, it is trained straight upward, until the maximum height of the tree is attained.

If the pruner commences with what is called a "maiden" tree, *i.e.*, a tree of one year's growth from the "graft" or "bud," and therefore a tree which has not before been pruned—he will cut the shoot or shoots (there may be more than one shoot, or branch from the "graft," or "scion," or "bud" placed upon the "stock" when the latter was grafted or budded) down to within three or four good buds from the point of origin. From those buds he will obtain three or four shoots, each varying in strength, during the first year after pruning.

On 24th March, 1906, a number of young bush Plum Trees were planted in the Experimental Garden at Droitwich, and these were pruned on 1st May. The growth of certain of these trees, which shewed an average of growth for the year of 1906, was measured during the following winter of 1906-7—*all growth of less than 9 inches in length being excluded from measurement*—and the aggregate growth upon each tree was as follows: Kirk's, 32 feet 9 inches; Monarch, 25 feet 8 inches; Smith's Purple Prolific, 24 feet 5 inches; Prince of Wales, 19 feet 6 inches; Pershore, 27 feet 3 inches!

At the end of 1907 the growth of the same trees was again measured, and with the following aggregate re-



Bush Apple, 'Ecklinville Seedling,' after producing three-and-a-half bushels of Apples of first-class quality in 1904. After pruning.
Planted in 1896 in the Experimental Garden, Droitwich.
From a Photograph

sults—growth of less than 9 inches in length being again excluded from measurement :—Kirke's, 101 feet 5 inches; Pershore, 95 feet 1 inch; Smith's Purple Prolific, 92 feet 8 inches; Prince of Wales, 81 feet 2 inches; Monarch, 71 feet 1 inch. We thus have five Plum Trees of different varieties, and under the same normal treatment (no mulching or watering) and pruned the same season as being planted, and after being pruned a second time, making in two years an aggregate growth as follows :—Kirke's, 141 feet 2 inches; Pershore, 122 feet 4 inches; Smith's Purple Prolific, 117 feet 1 inch; Prince of Wales, 100 feet 8 inches; Monarch, 96 feet 9 inches; notwithstanding growth of less than 9 inches in length had been excluded. This as a result of pruning in the *correct way* and at the *right time*.

At the second year's pruning those branches will be pruned, each according to its capacity, to produce two or more branches. The strongest branch should be usually cut least severely, but sufficiently to cause it to develop the good buds left for the purpose of producing good growth. The Branch less strong should be pruned a little more severely, also for the purpose of obtaining good growth therefrom. And the weaker branch—if it is capable of producing satisfactory growth subsequently — should be cut back most severely; in each case cutting to the best and rightly-placed bud. Any shoot incapable of producing good growth should be cut entirely away at this pruning.

More care is required in pruning the tree at the end of the third year, because there is then a superfluity of branches, and some must be entirely removed (see



Apple, "Lord Grosvenor," in flower 11th May, 1906.
Crop in 1904—167 lbs.
Planted 1896 in the Experimental Garden, Droitwich.

Rules 2 and 6). The branches to be removed are those which are not required to form a perfect and symmetrical tree, and all those which are overcrowding. Some small shoots near the base of the branches may be cut to form spurs.

The pruning after the fourth year's growth is similar to that for the third year; adding new branches as the tree increases in height; removing superfluous branches; and shortening, to form spurs, some of the small shoots as they grow on the annually extending branches.

Having obtained a good and well-shaped tree, and a tree in a fruitful condition—as it now should be—the operator must exercise care annually to promote healthy growth and secure free access of light and air to all the leaves and all parts of the tree above the soil. To this end he should avoid cutting the leading branches too severely, and he should keep the branches well apart from each other: two feet apart at four feet from the centre of the tree is a satisfactory distance in the case of strong growing varieties; and eighteen inches in the case of less robust varieties; but if size and colour are desired, then more space should be given.

BUSH TREES are treated similarly to pyramidal trees, with the difference that an open centre should be maintained instead of a central stem. Therefore, the central growths ought to be removed at the second winter-pruning, and the centre be kept clear at all times.

HALF-STANDARD trees should be pruned in the same way as Standard trees. The height of the stem ..

three to four feet, instead of five to six feet, in the case of standards--constitutes the only difference between them.

CORDON TREES—double cordon or single cordon—are limited to one or two stems. The side shoots or branches are not allowed to extend, but are annually cut back to spurs. The spurs should be thinned when they become crowded; an average of nine inches between the spurs being nearly correct. Proper root-pruning prevents too much growth and promotes fertility.

GOBLET or CUP-SHAPED trees may be easily formed out of a dwarf or bush tree, after two years' pruning. Insert into the ground, at a distance from the stem of tree equal to the diameter of the desired Goblet or Cup—usually two feet from the stem—three durable stakes, equidistant apart. To these stakes, which should be quite vertical, fasten three hoops of wood or iron; the first hoop at fifteen inches from the soil, the second hoop fifteen inches higher than the first, and the third hoop fifteen inches higher than the second. That will be sufficient framework for a tree four feet six inches high, and when covered with branches to that height will represent a very proportionate Goblet or Cup.

Cut away all the central part of the tree or four-year-old bush; reserve as many of the outside branches as may be required to furnish the outline of the Goblet with branches at fifteen inches apart all around, and cut the smaller branches to one or two buds to form fruiting spurs. Probably some force and manipulation will be

required at first to get the branches into their proper positions, but if they be firmly tied there the chief difficulty will be overcome.

The subsequent details of pruning will consist of shortening the leading shoot to a bud which will produce a shoot which will grow in a vertical direction, and low



Half-Standard Apple, 'Betsy Geeson,' after producing three bushels of Apples of good quality in 1904.

Planted March, 1898, in the Experimental Garden, Droitwich.
From a Photograph.

enough to cause the development of side growth. The latter to be annually cut back to one or two buds, and thus to form fruit spurs.

ESPALIER TREES are easily obtained by pruning and a little training. The most important point to remember is that *three* good shoots *must* be obtained in the right positions each year until the tree has attained its maximum height. The loss of buds, from various causes, sometimes creates a serious difficulty, and the nearest suitable branch may be many inches away. This is unfortunate, and an imperfectly shaped and trained tree must either be accepted, or the branch must be obtained at the right place by budding or shield-grafting at that point, or by carefully training a young branch in the space to be filled.

A young espalier-trained tree should have a central or leading branch, and one or more pairs of side branches growing at a right angle from the stem, and nearly opposite each other.

The uninitiated pruner may be puzzled to know how to obtain the concurrent growth of the three branches necessary to continue the formation of the perfect tree. Examination of the central branch will reveal four or five buds within a space of three or four inches, and about ten to fourteen inches above the last horizontal branches. If the operator stands exactly opposite the tree, he will see a bud exactly facing him at the height mentioned; and he will also observe a bud on the right and another on the left and below that central bud. There he has the means of obtaining the three desired branches. He will cut the shoot down to the bud exactly



Cordon Apple Trees. Part of a row in the Experimental Garden, Droitwich.

To show habit of growth and style of pruning.

From a Photograph.



Cordon-trained Apple. 'Stirling Castle,' in Experimental Garden, Droitwich, 1907.

opposite to him, and he will at once have done all that is necessary at the time. The bud to which he pruned will continue to grow straight upward; the buds below on the right and left also produce shoots, and the three shoots may be assisted to grow (with a little tying) in the direction desired: one vertically and two horizontally.

The above procedure should be continued annually until the tree has attained its maximum height, or the height allotted to it.

The horizontal branches should be annually pruned to a bud—a good one—on the lower side of the one-year-old wood (the wood of the previous season). The young growth naturally rises and a more perfectly straight branch will be obtained with less trouble than would be the case if the shoot were cut to a bud on the upper side.

But there is no unalterable rule for the foregoing practice, which may be altered to meet the requirements of the varying character of the trees and of their branches. Sometimes it will be better to prune to a bud on the upper side of the shoot, and sometimes to a bud on the face of the shoot exactly opposite the pruner, and which buds are termed "fore-right" buds. The efficient pruner will be master of the situation and he will cause the buds and trees to do according to his will.



Apple 'Pott's Seedling,' after producing two and three-quarter bushels of Apples of first-class quality in 1904. After pruning.

Planted November, 1896, in the Experimental Garden, Droitwich.

From a Photograph.



Apple, 'Loddington Seedling,' shewing style of pruning Standard Apple Trees.

Planted 1896 in the Experimental Garden, Droitwich.

'From a Photograph.'

CHAPTER IV.

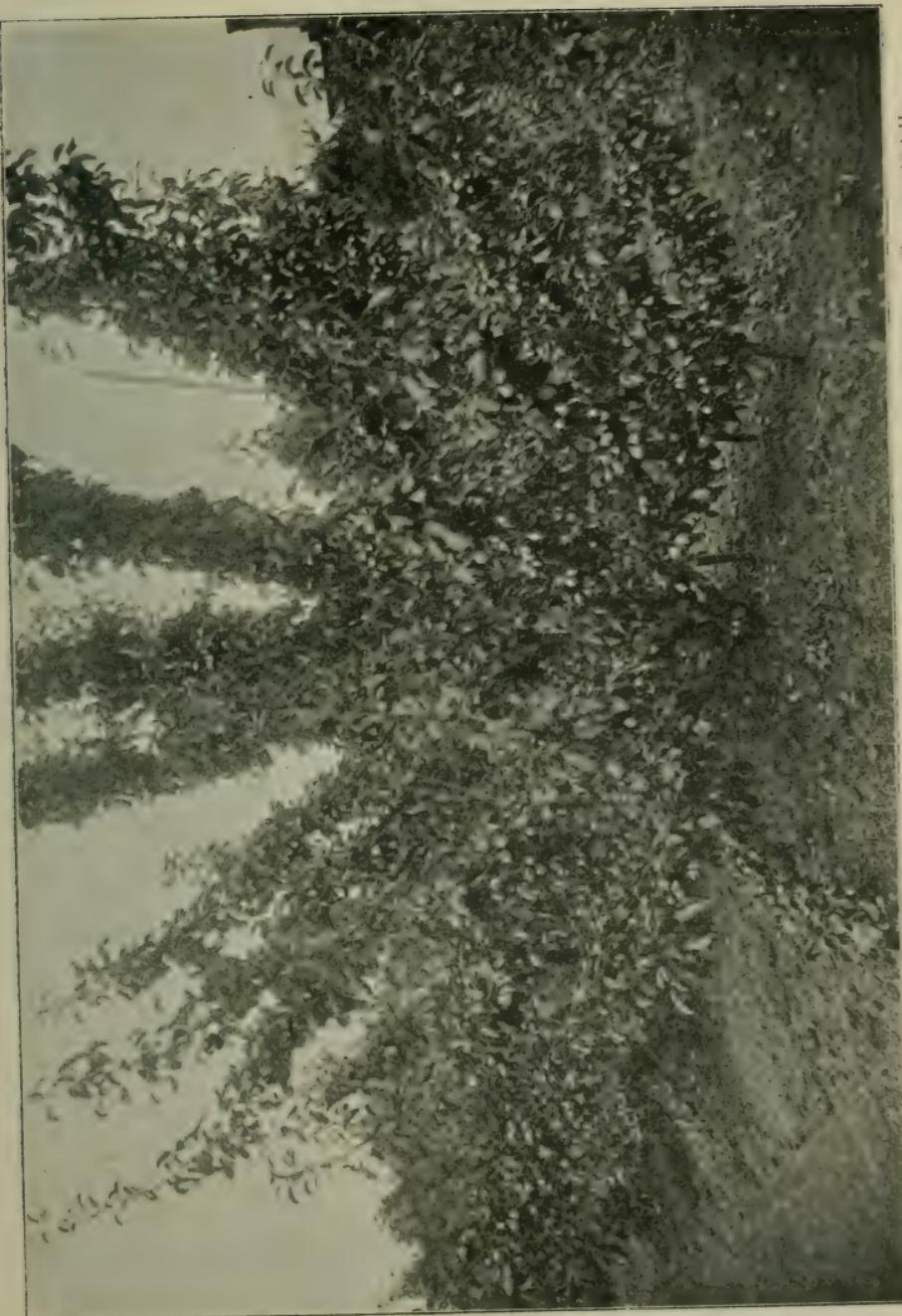
THE PEAR.

THE pruning of standard pear trees in their early stages of growth will be the same as for apple trees grown in that manner; with the slight exception that the natural habit of the pear tree is more erect than that of the apple. Consequently, it is not good policy to try to force the pear tree out of its natural habit; but to allow it to assume its proper shape within modified limits.

When the trees have attained their fruit-bearing stage, they should be annually inspected, and any wrongly-placed, overcrowding, and crossing branch or branches be removed.

Aged trees, both of the pear and the apple, occasionally require the amputation of a large branch; and often there is no possibility of the surface of the wound being covered by new tissue, owing to weakness arising from age and other causes. In such cases it would be an error to sever the bough close to the stem, as advised for trees sufficiently vigorous to quickly heal the wound. Because then the wood shrinks, water would be retained, and decay quickly become established; and in due time there would be a hollow-stemmed and decrepit tree.

In a case of this kind a stump should be left from three to six inches in length, according to the diameter of the branch and probable life of the tree; and thus



Bush Pear Tree, 'Fertility,' in the Experimental Garden, Droitwich, 1908. Crop—304 lbs.

the stem will be preserved from hollowness and decay for many years, if not for the whole life of the tree. The stump should be cut with a slope from above towards the stem below, thus preventing the lodgment of water thereon. Paint the surface of all large wounds.

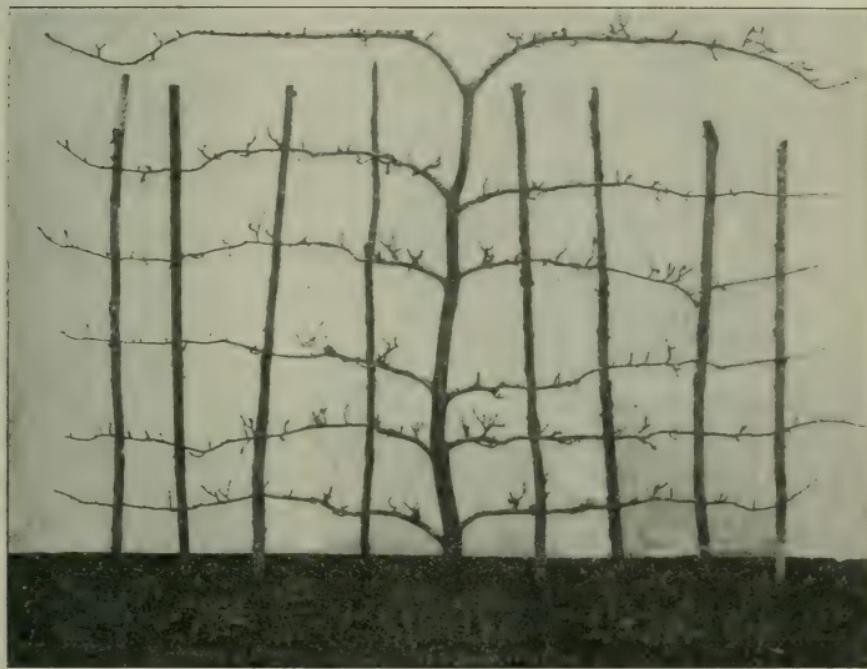


Part of a Bush Apple Tree, 'Red Ingestre,' planted in 1896
Neither pruned or sprayed at any time, and shewing branches
covered with American blight.

From a Photograph.

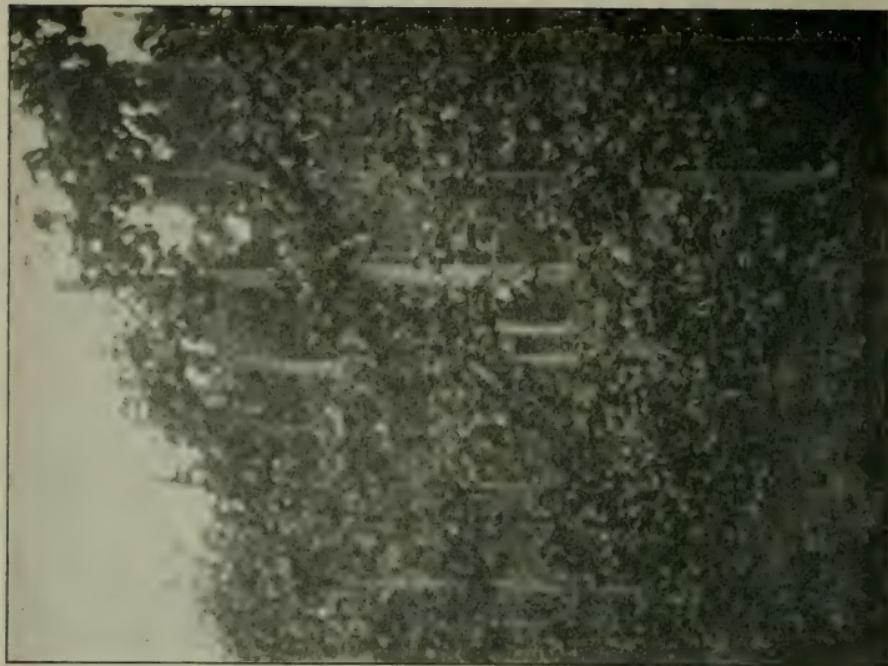
no matter whether they will, or will not, be covered with new woody tissue. Use Stockholm tar, red lead paint, creosote, or common tar as agents for this preservative purpose.

TRAINED TREES will require more pruning than the removal of superfluous or misplaced branches. Bush trees and pyramidal trees ought to have their main



Pear, 'Citron des Carmes,' Espalier-trained. Planted 1897.
Produces good crops annually.
From a Photograph.

branches eighteen to twenty-four inches apart from each other. The spurs on those branches should be quite six inches apart; and as they increase in age and size they should be thinned out to that distance by means of the knife or saw, and the wounds be made perfectly smooth.



Year, 'Marie Louise d' Uccle.' Crop—131 lbs.



Apple, 'Cellini.' Crop—29 lbs. Grafted 1904.



Pear, 'Doyenne du Comice,' in the Experimental Garden, Droitwich, 1907.

Crop—90 lbs.

The young side-growth formed during the previous growing season, or what was left at the summer-pruning, should then be cut back to the best and rightly-placed bud. If the branch has attained the maximum length or limit permissible the leading shoot should be treated in a similar manner; but if the tree has not attained its limits, or covered the space available, then the branch may be allowed to extend, and the leading shoot be left six, nine, or twelve inches in length—in proportion as it may be a weak or a strong shoot.

Other forms of trained pear trees—whether espalier, cordon, palmette verrier or fan-trained—should have the main branches kept at least a foot apart; and the spurs should be pruned in a manner similar to those upon the bush trees and pyramidal trees. No spurs should be allowed to grow *between* a branch and the wall; neither is it usual to see them on the front of the branches, but they are usually left alternately on the upper and lower sides—at about seven or eight inches apart—of well-trained trees.

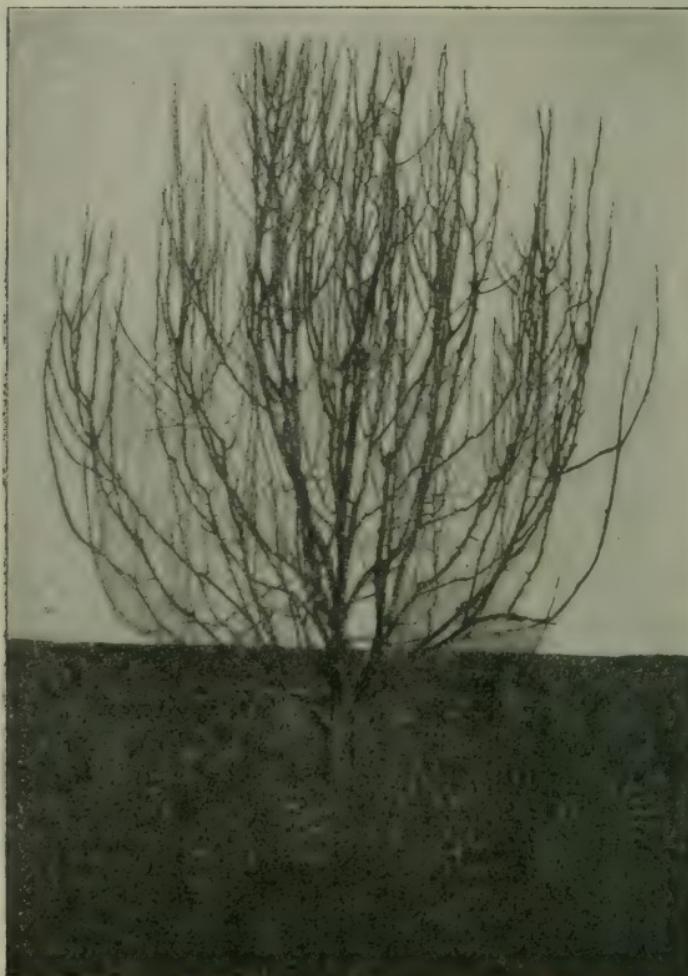
THE PLUM.

Though probably all varieties of plum trees are better for pruning, there can be small doubt that it should be carried out with considerable discretion. Many varieties bear freely upon last year's wood, and when trees have been planted several years and grown freely, there is a very great temptation to allow them to bear all the fruit they offer and to not prune them. If vigorous, long-lived and well-formed trees are desired the temptation to leave them unpruned must be resisted;



Pear, 'Clapp's Favourite,' in the Experimental Garden, Droitwich, 1907.
Crop—110 lbs.

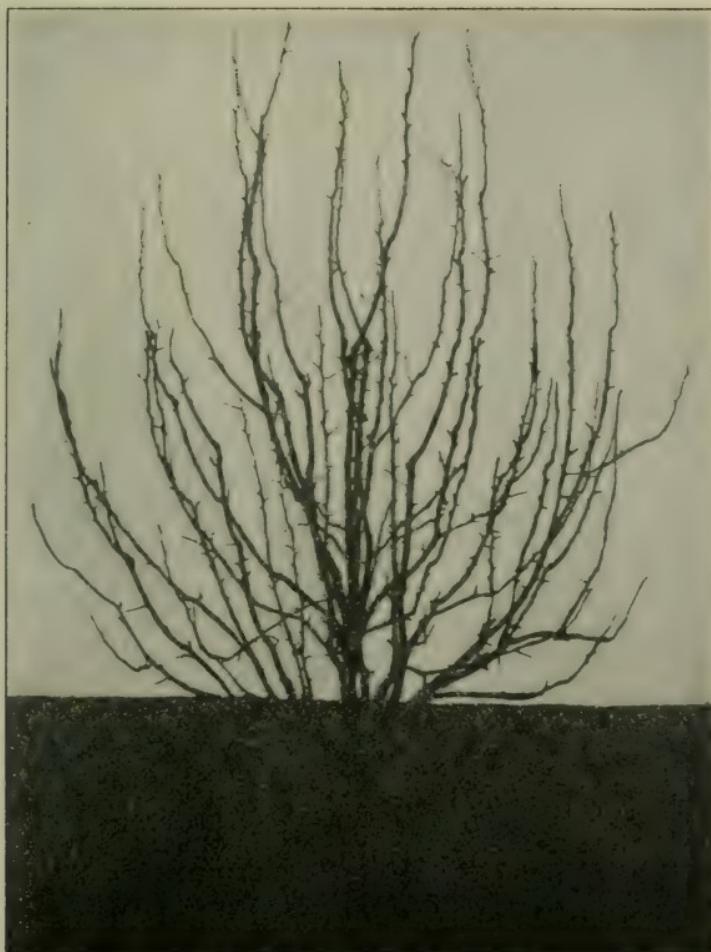
but if the sole object is to obtain the most fruit in *the shortest space of time*, even to the exhaustion of the trees as well as to the destruction of their good appearance, then the reduction of the crop by pruning need not be considered.



Pear, 'Williams' Bon Chretien.' Planted 1908. *Before Pruning.*

From a Photograph.

And I may here offer a few remarks about fruit culture by "express." Probably there is no system of fruit culture so easy or so simple. The inexperienced think that extraordinary knowledge and skill are required; that is not so. It consists simply of taking all the fruit possible from a plant in the shortest space of



Pear, 'Williams' Bon Chretien.' Planted 1898. *After Pruning.*
From a Photograph.

time, to its complete exhaustion; destroying that plant or those plants; and replacing them by others to undergo the same process. This system has been adopted with cucumbers for about sixty years, and more recently with vines for the production of grapes. The same may be done with hardy fruits in the open if the owner so desires. He has only to decide whether he will exhaust and replace his trees every five, ten, or twenty years, or whether he will not. Whether he would prefer an average weight of ten, twenty or forty pounds of fruit for five, ten, or twenty years from trees half their normal size as a result of severe root and branch pruning: or whether he would rather have forty, eighty, or one hundred and sixty pounds of fruit annually for a larger number of years from trees grown to a full average size—which is somewhat different to “Cucumber-growing by express” though connected in principle.

It is well to remember that a stunted tree—from whatever cause—bearing 40lbs. of fruit *appears* to have more fruit than a tree twice as large, and bearing 100lbs. of fruit; but many persons are deceived thereby, and it is only by careful annual weighing that the truth is known.

Reverting to the chief subject. Standard plum trees—after the first two or three prunings—should not be pruned so severely as apples or pears. After the “head” has been formed there is little to be done except to remove a secondary branch here and there where it is overcrowding, or crossing another branch; but little as may be required, the trees should be annually examined and the necessary branch or branches removed.

Trained trees have their branches well supplied with spurs and short, young, fruit-bearing wood. The latter, in such cases, is usually also cut back to a spur; but if they are only two or three inches in length they may be left unpruned. Cut out all dead growth and "snags"—which are unsightly as well as injurious.

Exhausted plum trees may often be rejuvenated by boldly cutting the whole of the branches down to within two or three feet of the main stem. Strong young growth is often the result, and the trees are rendered more vigorous and fruitful for a few more years.

THE PEACH.

The Peach usually bears fruit on the wood of the previous year, and more regard should be paid to the annual production of fruit-bearing wood than to the formation of fruit-bearing "spurs."

Good peach growers properly insist upon cutting out all superfluous growth and that which has borne fruit immediately the crop of fruit has been gathered. By so doing, the foliage upon the remaining shoots receives the full benefit of more light and air, and is enabled thereby to manufacture more perfect peach wood. This wood possesses a larger supply of stored-up food in its tissues, and more perfect and better-nourished flower buds and wood buds, which in due course—all other conditions being equal—will produce better fruit and more of it.

Winter-pruning consists of cutting out any dead or very weak shoots and any growth for which there is not abundant space. In deciding which shoots are too weak for fruit-bearing, perhaps the following hint may be useful: wood $\frac{3}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ inch in diameter is fruitful

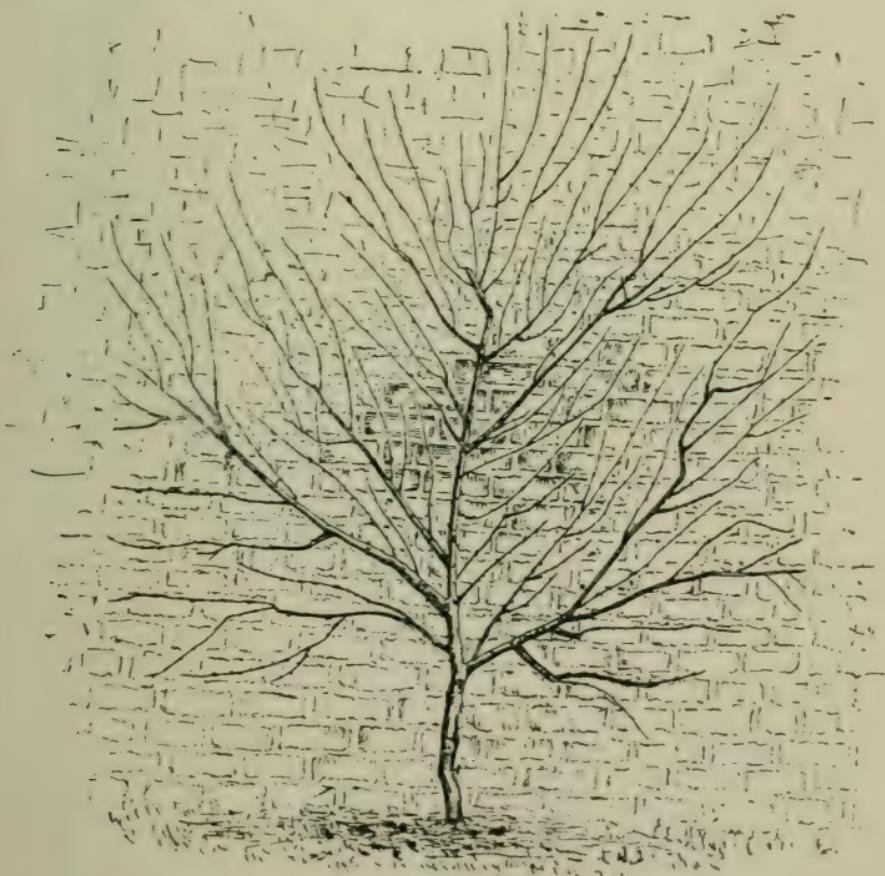


Portion of Peach tree in flower in Peach-house at Impney, Droitwich.
Shewing the bearing-wood thinly distributed.
From a Photograph.

under proper cultural conditions, growth that is stronger or weaker seldom produces fruit. If the young growth (the growth of the previous season) is so distributed all over the area to be covered—either walls or trellis—that each shoot is four inches from its neighbour, the tree and the pruning will be almost perfect; and the fruit will be proportionately good. Care should be taken to cut neatly, cleanly, and close to the point of origin (Rule 2). The

NECTARINE.

should be pruned like the Peach tree.



Peach Tree on outside wall at Impney, Droitwich.

APRICOT.

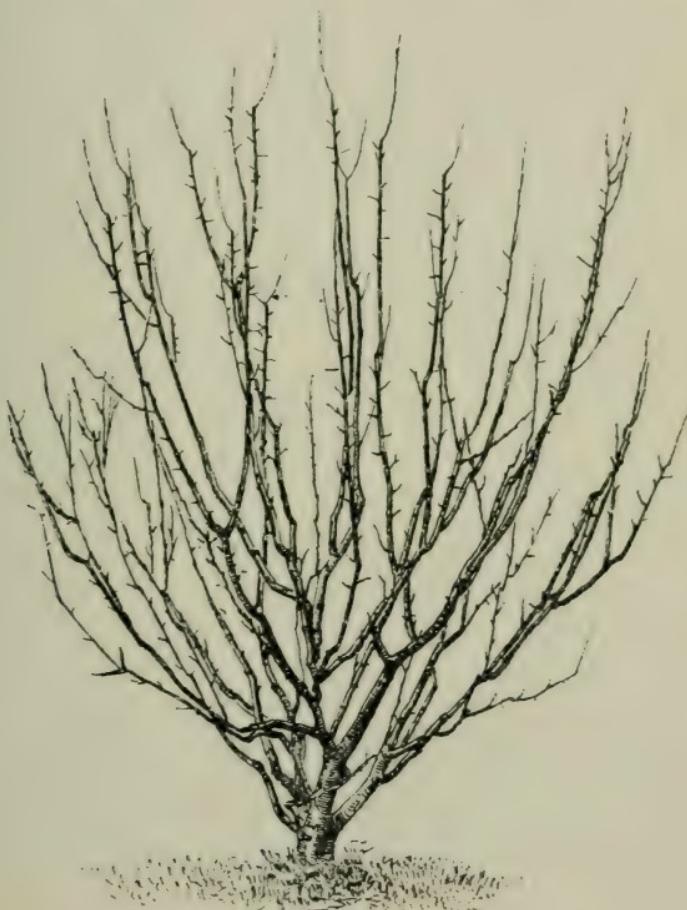
The Apricot fruits upon spurs and upon wood of very good quality of the previous season's growth. The main branches of an apricot tree should be widely distributed over the wall, or other support against which it is growing; and the best form of training the tree, with the object of obtaining evenly-balanced growth, is that



Plum, 'Monarch.' Six years after planting.

Before pruning.

of an open fan. Three, four, or five main branches should be trained very widely apart on each side of the centre, the centre being always kept open in the form of a **V** until the tree is fully grown, when the whole space may be filled. As the main branches will produce secondary branches in due course, the latter should also be trained midway between the main branches.



Plum, 'Monarch.' Six years after planting.
Produced half-bushel of fruit in 1905.
After pruning.



Plum, 'Grande Duke.' Planted 1896 in the Experimental Garden, Droitwich.
Before Pruning.

From a Photograph

And as they in turn produce other smaller branches, the latter should be also nailed or tied into position.

The young branches last mentioned should have a space of three inches between each other; and any shoot in excess of the number required to cover the space at the distance apart mentioned must be cut away.

As the work of pruning proceeds, all dead, weak and exhausted wood should be removed, and the space thus provided be used for the accommodation of the better and fruitful shoots.

Fruit-spurs upon the older branches must be kept at a suitable distance from each other, viz.:—four or five inches; and all spurs upon the face of the branches—or pointing exactly towards the operator—should be removed with a sharp knife or saw, and the wounds be made perfectly smooth.

THE CHERRY.

SWEET CHERRIES are easily grown as standards in gardens and orchards. They require very little pruning when grown as standards, and that little should be given in their early years of growth, when the branches are small. Usually that pruning is required for two objects—sometimes one and sometimes the other—either to increase the number of branches for the proper formation of the tree, or for the purpose of reducing their number and the prevention of over-crowding. After the tree has been properly formed the knife and saw should know it no more. But if, unhappily, amputation must be resorted to when the tree has approached or arrived at maturity, then *the operation should be*



Plum, 'Grande Duke.' Planted 1896.

After Pruning.

From a Photograph

performed immediately after the fruit has been gathered, and whilst the trees are in full leaf; the remaining leaves utilise the sap which would have circulated along the amputated limb, and thus prevents in a large degree the evil of "gumming," which is disastrous.

The culture of sweet cherries upon a wall or trellis is very simple. It consists of training a certain number of branches in any desired direction to give a tree the shape in view. Having formed the tree by means of its main branches, the sideshoots thereon should be annually cut back to spurs. The spurs should be six inches apart, and all nearer than that should be removed by knife or saw.

MORELLO CHERRIES are a little more troublesome. If grown as bushes the pruning will consist of cutting away all superfluous branches and those which are exhausted; also in thinning out some of the young shoots where they are too numerous and exclude light and air. This kind of Cherry produces fruit very freely upon wood of the previous year; hence great care is required to avoid cutting away too much of that wood.

Where the Morello Cherry is grown upon walls they are usually relegated to the most sunless ones, because they are so fruitful under such adverse conditions; but they appreciate and repay for a more favourable aspect.

The pruner should keep an eye to the proper extension of the tree and therefore retain sufficient young leading growth. It is good policy to cut away all young shoots which are not required for extension of the tree, or for the production of fruit the following year, as soon



Plum 'White Perdrigon.' Planted 1897. Bears freely without grafting.
Often grown as 'White Magnum Bonum.'

After Pruning.
In the Experimental Garden, Droitwich.
From a Photograph

as possible after the fruit has been gathered. By so doing, light and air are more freely admitted to the leaves which remain, the wood is thereby made more fruitful, and the winter-pruning is reduced to a minimum.

Winter pruning will consist of cutting out any branch or shoot which is likely to overcrowd the tree; in cutting back to one or two buds all young shoots which arise from spurs; and leaving un-shortened all good growth of the previous season for which there is adequate space. Moreover, all dead spurs, shoots and branches should be carefully and cleanly cut away. The young wood for producing fruit during the following season should be tied in at about three inches apart all over the tree if it be grown against a wall or fence.



Obliquely-trained, Cordon¹ Pears, 1907. In Experimental Garden, Droitwich.

CHAPTER V.

CURRENT: BLACK.

BLACK Currants fruit most freely upon one-year-old wood; and the pruning first consists of cutting young trees severely back for three or four years until good bushes have been obtained. Afterwards it is simply an annual routine of cutting down to the ground any exhausted old branch, from the base of which sturdy young growth usually appears the following season, to give in turn abundance of fruit for a series of years; and so the re-juvenation of the trees may continue for many years.



Black Currant tree, with branches growing from below the level of the soil. Pruned.

Right.

Grown from cutting taken from tree shewn on following page.

Well-managed trees are always supplied with a superabundance of young growth, and the additional pruning to that above is only a matter of thinning out the young wood. This should be done with a sharp knife, and all shoots which are nearer together than five or six inches ought to be cut out; thus leaving the fruit-bearing wood at an average distance apart of five or six inches all over the tree.



Black Currant tree grown on single stem. Pruned.
Wrong.

CURRANT: RED.

A well-formed and well-developed tree will have about nine main branches and be four feet or four feet six inches high. The branches will be so wide apart that the sun will shine upon the lowest leaves, and thus the trees will bear fruit the whole length of the branches if the variety is a fruitful one and the management good. These branches will be of nearly equal height and



Red Currant tree; never pruned. Crop—2 lb.—3 lb.

Planted 1896. Photographed March, 1905.

From a Photograph

strength, and will radiate from the main stem at four or six inches above the ground. If the tree is properly furnished with these main branches, secondary branches will be superfluous and harmful. A tree not so grown will be an imperfect specimen of its kind and incapable of bearing so much fruit.

Many currant trees are ruined after their third or fourth year of pruning, solely because the pruner has not sufficient knowledge of his work, and consequently is deficient in courage to continue to prune rightly; and



Red Currant tree, annually pruned. Shewing the growth of 1904. Shortened in July; to be further pruned in Winter to the points indicated by the thick, short lines. Crop—10 lb.—15 lbs.

Planted 1896. Photographed March, 1905.

from that time forth the vigorous young trees become crowded with branches in the upper part, and destitute of fruit upon the lower half. At that critical period the pruner should dare to cut out the healthy side branches which do not crowd the tree at the moment, but which *will do so two years afterwards.*

A tree so treated will appear to be over-pruned for the time being; but all well-pruned *young* trees have that appearance, and the red currant is not an exception to the rule; and although it is a very common, and humble, and easily-grown fruit, it requires—and will amply repay—skilful pruning.

Having pruned and perfectly formed the tree in its youth, the subsequent pruning is the most simple of all pruning operations.

It consists of cutting all the side-shoots to within an inch of the base of its own growth. Or in other words, of cutting away all the young growth to within one inch of the base of each young growth. Then the leading shoot of the main branch—which should be annually encouraged to grow until the branch has attained its maximum height—should be pruned. If the branch has attained its full height the leading shoot may be pruned severely, leaving only an inch or less, as in the case of the sidegrowths, but if the tree has not yet grown to its full size, then the pruner should leave four, six, or eight inches of young growth—four inches of weak growth; eight inches of strong growth. Moreover, he should be careful to cut to a rightly-placed bud, which nearly always faces the outside of the tree and points in an upwards direction.

WHITE AND PINK CURRENTS

should be pruned in the same manner as directed for Red Currants.

THE GOOSEBERRY.

The pruning of Gooseberry trees is very seldom pleasant employment; but there are right and wrong methods even of pruning that humble deciduous shrub. The task is much easier when commenced and completed in the right way: and the wrong way is nearly always most harmful to the tree and its owner.



*Gooseberry. Before pruning.
From a Photograph.*

If all the previous year's growth of a healthy and vigorous tree be persistently pruned to less than half its length, and without any judicious *thinning*, such tree will sooner or later be either a thicket of useless and barren wood, or fruitless through sheer decrepitude.

A young gooseberry tree, like all other young fruit trees, should be severely pruned for several years for the purpose of promoting vigorous growth and the production of numerous branches for the formation and up-building of a robust and well-formed tree.

After the third year from the cutting state, the young tree will commence to bear fruit, or even before that time; and it may then be annually pruned as a fruit-bearing tree, though not fully grown.

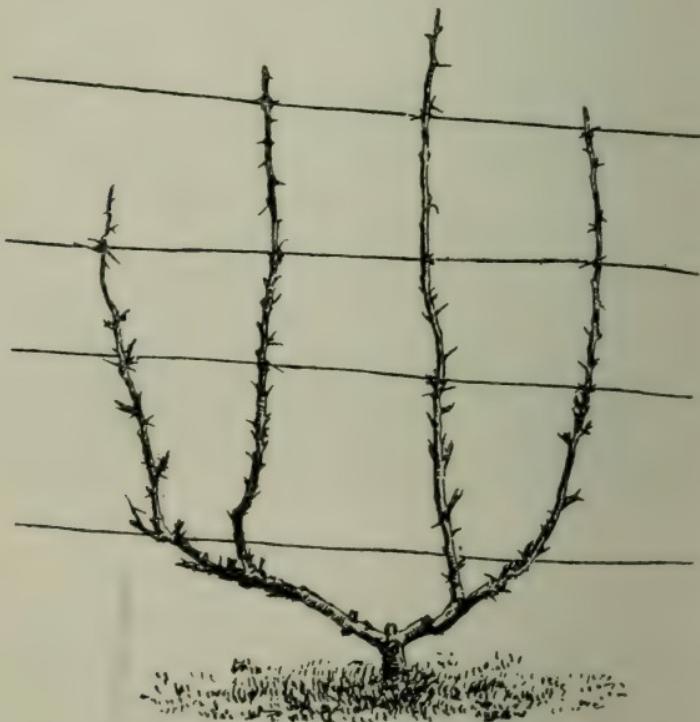


Gooseberry. *Before* pruning.
From a Photograph.

The right method of procedure is: firstly to remove any branch that is too near the ground; secondly, to cut away any branch or branches that are crossing or interfering with other or rightly-placed branches; thirdly, to cut back to a "spur" one inch long all shoots

that are not required to furnish the tree with young bearing-wood. To express my meaning more clearly; the one-year-old shoots should be left at five inches apart all over the tree, except at the centre—which should always be kept open, all other shoots should be cut back to within one inch from their base, to form spurs.

We now only have to decide whether the shoots left at five inches apart shall, or shall not, be shortened. The answer will depend upon their length and strength. If more than nine inches long they may be cut back half their length; if less than nine and more than six inches



Gooseberry, Espalier trained.

Shewing the system of pruning in the side shoots to form 'spurs.'

long, one-third their length may be removed; if less than six inches they should not be shortened. The above instructions may be modified to meet the requirements in market gardens and fruit farms; but the nearer those instructions are annually followed, the greater will be the average annual weight of fruit per tree.

THE RASPBERRY.

Raspberry-pruning should commence in late summer or early autumn, by cutting out the old canes which have just borne their crop of fruit; the beginning of September is a good time for the operation. The early removal of those exhausted canes will allow the freer access of light and air to the leaves upon the young canes whose duty it will be to produce fruit the following season. The extra supply of light and air to those leaves will promote the more perfect elaboration of the material manufactured by the leaves, and duly passed to the canes in the form of healthier and more perfect tissue of the raspberry-cane, which in turn results in the production of more and better fruit.

The winter pruning consists of cutting out all weak canes, and any for which there is not adequate accommodation; and in shortening the remaining canes only by so much of the cane as *is not capable of producing a panicle of fruit*. If the best canes are not more than five feet high, there need be no time spent in shortening them, so far as all practical purposes are concerned; but if they are six feet and more in height, then it may be desirable to shorten them to about five feet in order to prevent serious damage by wind when the canes are in full leaf and bearing fruit.

THE BLACKBERRY (American and English).

These should be annually pruned; but the growth made during the previous season ought not to be pruned or cut back. Cut out all the old growth which has produced fruit, as in the case of the Raspberry, and tie in the young growth its full length—training it as nearly horizontally as possible.



Young tree of Gooseberry in fruit, shewing the fruit in the one-year-old wood.

THE LOGAN-BERRY.

Treat the Logan-berry as advised for the Blackberry.

THE JAPANESE WINEBERRY.

This may be treated like the Logan-berry and Blackberry; or it may be pruned like the Raspberry in field culture and made self-supporting. In the latter case cut away the old wood down to the ground and shorten the young wood to about three or four feet in length.

VINE (*Grape*).

Grape vines are usually grown upon the single rod system, and occasionally upon the extension system, whereby the famous vines at Hampton Court, Cumberland Lodge (Frogmore), and Dover House (Roehampton) have been obtained. At the Royal Horticultural Society's Exhibition of Fruit, on the 5th October, 1920, was exhibited a magnificent collection of Grapes from the Kippen Vinery Co., Kippen, Stirlingshire, to which a Gold Medal was unanimously awarded. The collection contained grand examples of "Gros Colmar" in fine bunches with immense berries covered with dense "bloom," the "Hall Mark" of superb "finish" and of masterly cultivation. I have not seen the like since 1868, when equally as fine grapes of Mill Hill Hamburg were grown by Mr. J. Meredith, at Guston Vineyard, Liverpool. The Gros Colmar grapes were from a Vine grown on the extension system. The latter is the most natural, the former the most artificial system. The chief reasons for the former system being so universal are (a) greater variety and longer supply of fruit, and (b) greater amenability of the vines to certain cultural conditions.



Apple, 'Devonshire Quarrenden,' in Experimental Garden, Droitwich.



Apple, 'Lord Grosvenor,' in Experimental Garden, Droitwich.

There are also two methods practised in pruning vines grown upon the single rod system; pruning to a short spur, and pruning to a long spur; each having its own merits and defects.

Pruning to a short spur consists of cutting the lateral (or side shoot) to within about half an inch of its base, leaving *one* plump bud. The long spur pruning consists of merely cutting the lateral to within two or three inches of its base and thereby leaving several prominent buds. The latter style of pruning is especially used to varieties of vines which are "shy" in producing fruit. Also in cases where a large quantity of fruit is required from a vine, and where the cultivator particularly desires to have an opportunity of exercising a larger choice as to the bunches of fruit he will retain or remove.

The bud left should, in all cases, point in the direction of the right and best position for the subsequent lateral growth.

There is some doubt amongst growers as to the proper distance for the best disposition of the laterals on each side of the main rod; but they are frequently too close together. The proper distance or space to be preserved between each lateral is governed by the habit and constitution of the variety. The laterals of the Frontignans and other small-leaved varieties do not require the same space as the laterals of Gros Guillaume, Gros Maroc, Frankenthal, or the strong varieties of Black Hamburgs. Therefore, good policy suggests that the cultivator should meet the requirements of each respective variety, and those requirements will be known and

met by the following rule:—The distance between each lateral should be *not less than equal to the width of two principal leaves*; which means, when practically applied, that a variety whose principal leaves are seven inches across should have a space of at least fourteen inches between the laterals; and a variety whose principal leaves are ten or twelve inches across should have a space of twenty inches or twenty-four inches. A large percentage of grape growers could apply the above rule at once, with great advantage to the vines and their owners.



Part of a Vine, pruned to long 'spurs.'
To be adopted only when closer pruning
fails to produce satisfactory results.

Vines grown in the open air against walls and dwellings are frequently grown upon a modified form of the extensive system. The vine is encouraged to develop a number of main branches from the parent stem for the purpose of covering the allotted space; these branches should be trained at eighteen inches to two feet apart—though they are often much closer—and the laterals on these main branches should be thinned out to eighteen inches apart and pruned annually to short spurs. The more thinly disposed branches would secure more light to the leaves, more sun-heat to the bricks, and more frequently good crops of better grapes.

There are a few good vines grown in the open air, without any shelter, notably near Cardiff. The late Marquis of Bute established several vineyards on his South Wales estate, and I have had the pleasure and advantage of visiting his vineyards at Castel Coch, with his late head gardener, Mr. Pettigrew, who had charge of them. These vines are grown exclusively for the purpose of making wine from their fruit, and there are four or five acres of them at Castel Coch.

About forty vines of the same variety—kindly supplied by the late Mr. Pettigrew—are also grown in the County Experimental Garden at Droitwich. They are annually cut down to within three feet of the ground, and to long spurs, similarly to those near Cardiff. A stout stake may be fixed near each vine, and the young growth tied thereto and allowed to extend to the top of the stake where it is stopped.

The reason for cutting the vines down near to the ground is to secure to the grapes the latent warmth of the soil, which materially aids their ripening; but for some years a greater length of young wood has been left upon some of the vines, and more vines have produced more grapes, but of less satisfactory quality.



Spur-pruning of Plum trees.

AAAA—All flower buds, therefore there cannot be any subsequent growth, and probably any fruit which may be formed will perish.

AAA—Flower-buds.

BBB—Wood-buds. The spur should be pruned at the line CD, and the wood-bud B will continue the shoot in the right direction.

CHAPTER VI.

ROOT PRUNING.

PROFESSOR BAILEY says in "The Pruning Book":—“In order to understand the vexed question of root-pruning, it is necessary that the subject be analyzed. We prune the roots of established plants—

- “1. To keep the growth within bounds, particularly when it is desired that the plant shall be dwarf.
- “2. To concentrate or contract the foraging of the roots.
- “3. To make plants fruitful.”

He further says:—“The same principles of physiology govern the practice of root-pruning as that of top-pruning. The wounds heal by the formation of a callus, germs of decay enter exposed wounds, new or adventitious roots start as the result of heavy pruning, the severed leader (or tap root) tends to renew itself. . . . Since roots have no buds, the new branches do not arise in as definite order as they do on tops, but this is a matter of no consequence, for the shape of the root system is of no practical importance. *The direction of the roots is important, however—whether they run horizontally and near the surface, or perpendicularly.*” The italics are mine. Every horticulturist of wide experience in fruit culture will endorse Professor Bailey’s statements as above quoted. And many will agree with the following:—The root-pruning of established plants is

practicable only on a small scale. It is practised in amateur plantations, or in those cases in which it is desired to keep plants within definite bounds or shapes. It is essentially a garden idea. It is practised in European enclosures, in the growing of trees to pyramids, cordons,



Apple, 'Lane's' Prince Albert.

- A—Dead 'snag,' which should have been pruned at the lines BC.
- D and E—Flower-buds.
- F—The leading shoot pruned to a wood-bud.
- G—A side-shoot cut back to a 'spur.'

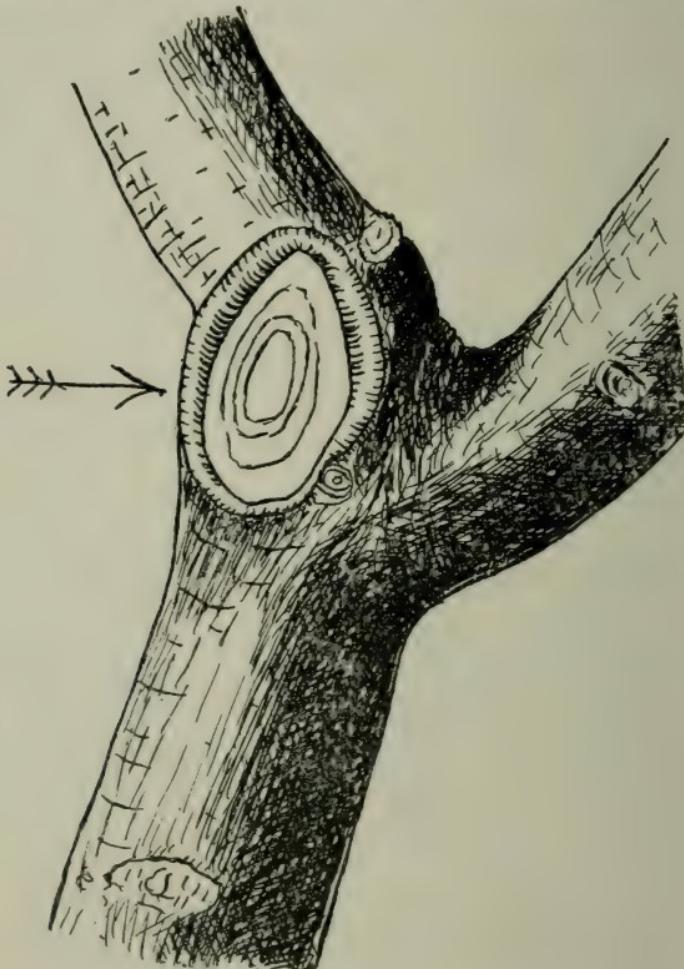
or espaliers, and the like. By cutting the roots they are kept within a prescribed area, and do not interfere with other plants. The tops of the plants are thereby checked of exuberant growth, and are more manageable on walls and trellises. In the well-tilled gardens, and in cool and moist climates, it is often thought desirable to keep the roots near the surface; but in American orchard conditions it is desirable that the roots strike deep." A very able writer on "Californian Fruits," writing on soil, says:—"Very commonly hardly a perceptible change of tint or texture is found for depths of several feet. . . . The second foot is rarely found to differ materially from the first, even as to humus content."

Professor Bailey also says:—"In the large area or field conditions under which American fruits are grown, root-pruning is rarely necessary, or even useful. Under such conditions, the plant takes its natural habit and reaches its normal stature, and fruit-bearing comes naturally with the maturity of the plant; or, if fruit-bearing does not come, the fundamental treatment lies in correcting faults of tillage, soil, varieties, or other cardinal matters."

In the last two paragraphs lies the whole argument for and against root-pruning. Each fruit-grower must study his own desires, and his trees; their natural habit and environment. I have already alluded to the matter in my remarks on pruning the Plum, therefore it is not necessary to repeat what is there said.

The advantages of root-pruning, where the operation is considered to be desirable, are five-fold: it promotes fruitfulness; improves the quality of the fruit under certain conditions; prevents the growth of gross and worthless wood; reduces the labour in branch pruning; and acts as a preventive of canker and gumming—especially in wet and cold, or very poor soil.

In commencing to prune the roots of a fruit tree, the operator should proceed in all respects as though he were about to transplant it to another position. Commence by digging a trench about two feet in depth and two feet in width around the tree. This trench should be nearly as far from the stem of the tree as the extent



Apple, 'Gascoyne's Scarlet Seedling.'
Wound one year old, showing formation of new tissue
Drawn from nature.
Correct pruning.

of the branches, or their radius. The larger the tree the greater is the necessity for opening the trench at a proportionately greater distance from the stem.

Care should be taken of all fibrous roots as the work proceeds in the excavation of the trench; and rambling and fibreless strong roots should be cut through with the spade or mattock. When a depth of about two feet has been reached, the workmen should then carefully undermine the tree all around and sever any strong roots descending into the poor subsoil—no matter whether they are what are called tap-roots or otherwise.

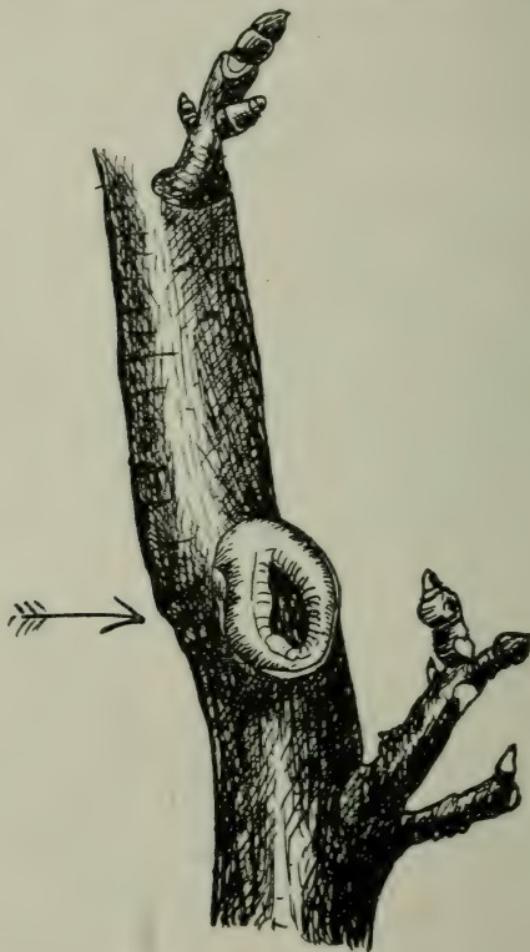
If the mass of soil is so large that there is difficulty in getting under the tree, it may be reduced by carefully removing—by means of a fork—the soil from between the roots, commencing at the circumference, and gradually working towards the centre. As the work progresses, the small and fibrous roots should be carefully tied together in bundles, and then tied in an upward direction towards the stem or main branches, for their protection and to facilitate the work.

Having got right under the tree and severed the undesirable roots by means of knife, or chisel, saw or mattock, the whole of the roots should be carefully examined and the ends trimmed with a sharp knife, taking care to cut them in an *upward* and *outward* direction; the new roots tending to grow more horizontally than when they are produced from the *under-side* of the pruned root.

The roots may now be replanted in the proper manner; in nearly horizontal position and layer after layer. The lowest roots should be brought to a nearly horizontal position and covered with soil up to the level of the next set or layer of roots; which in their turn are spread out nearly horizontally and covered with soil up

to the next layer of roots; and the operation should be repeated until the planting has been completed.

A more expeditious method of root-pruning is sometimes adopted in which the main roots are ruthlessly chopped through, not far from the stem, by means of spade and mattock. The tree receives a severe shock, from which it never wholly recovers. It



Apple, 'Lord Grosvenor.
Wound two years' old, showing formation of new tissue.
Drawn from nature. *Correct* pruning.

is thrown into a debilitated condition and produces fruit freely. The mutilated roots decay; corresponding branches die; and the subsequent state of that tree is not creditable to either its owner or custodian. The tree continues to produce fruit and thereby reproduces its species before it dies; it dies an untimely death and is ignominiously cast into the fire.

DISBUDDING.

By judiciously disbudding a tree the operator performs an act which at once prevents the possible overcrowding of leaves and thus secures to them the conditions absolutely necessary for the proper discharge of their very important functions. Moreover, it effects a considerable saving of energy and material in the economy of the tree.

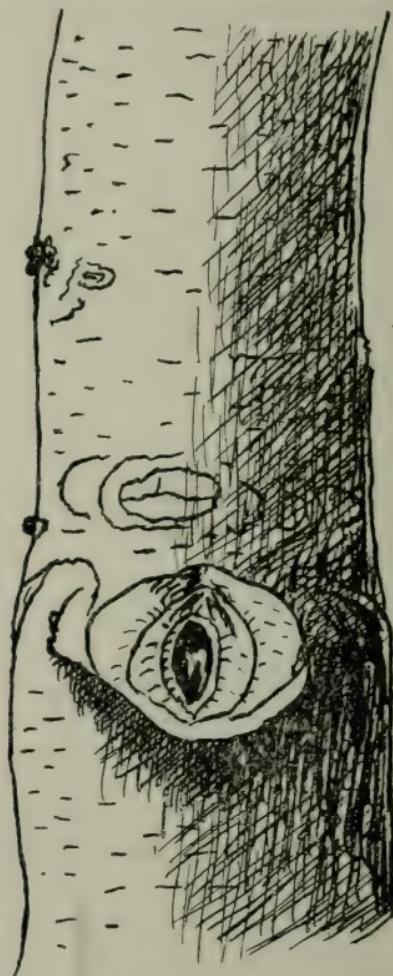
Growth which must be cut away at a later period represents, and is, so much waste of force and matter; and not only is it waste, but it has, by its temporary presence in the tree—except in special and very rare instances—directly injured the quality of the permanent part of the tree; because it has both obstructed the passage of the rays of light to the leaves, and utilised food which would have been better left for the use of the permanent part of the tree.

Disbudding means the removal, by means of finger and thumb, of all misplaced and superfluous wood-buds: buds whose function it is to develop a new branch during the current season of growth.

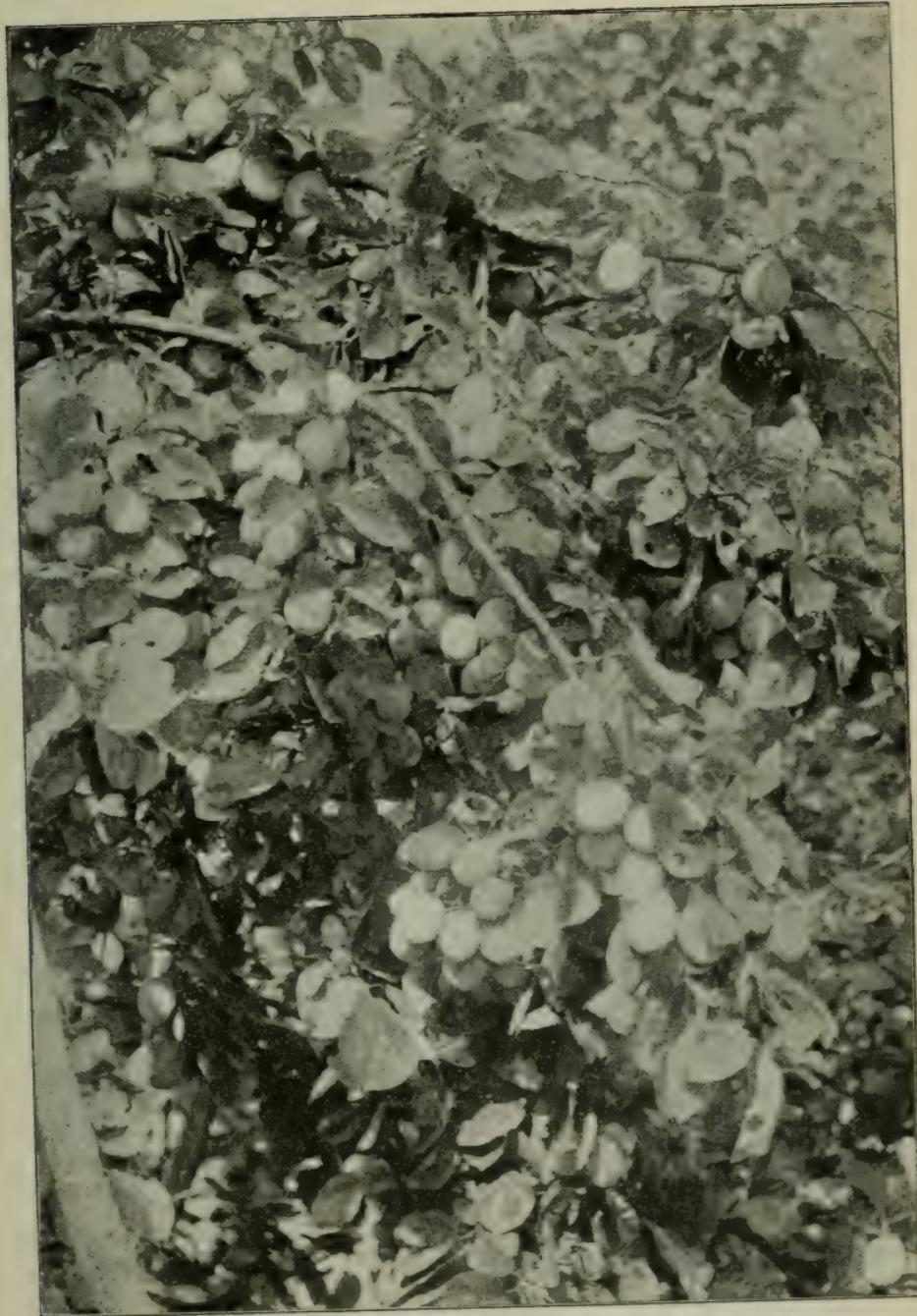
Standard trees of Apple, Pear and Plum—especially young trees, and old trees that have had one or more large branches cut from them—usually produce superfluous young growth from adventitious buds in proximity to the parts from which large or small branches have been removed. Too often these growths are allowed

to remain for, at least, a season. That is a mistake. They should be rubbed out with the hand directly they commence to grow, and by that timely act much time may be saved and some injury averted.

Pear trees—when trained upon walls or trellis, or as pyramids, should receive attention in regard to disbudding. Much unfruitfulness in future years would



Plum, 'Washington.'
Wound three years old, nearly covered with new tissue
Drawn from nature. *Correct* pruning.



Part of branch of 'Pershore' Plum in Experimental Garden,
Droitwich, 1907.

be avoided if this necessary operation were faithfully and annually carried out. It is known that two or three year old wood of the pear tree is usually the most fruitful, and that the branches often become barren as they increase in age. But the true cause of the barrenness is not old age, but the want of light and air to the leaves upon these older parts of the branches. The spurs upon them annually increase in size and become too crowded. They must then either remain unfruitful, or be reduced in number. But if disbudding had been efficiently performed at the right time, i.e., in the spring of the second year of the growth of the shoot, the subsequent crowding of the spurs would have been prevented, both for the present and for many future years.

Plum trees—when trained—should be disbudded in the same manner as Pears, viz.: all the back and front (foreright) buds should be rubbed out, and some of the buds above and below; but as the leaves of the Plum tree are smaller than the leaves of the Pear tree, the spurs or buds should be left five inches apart for the former and seven inches apart for the latter.

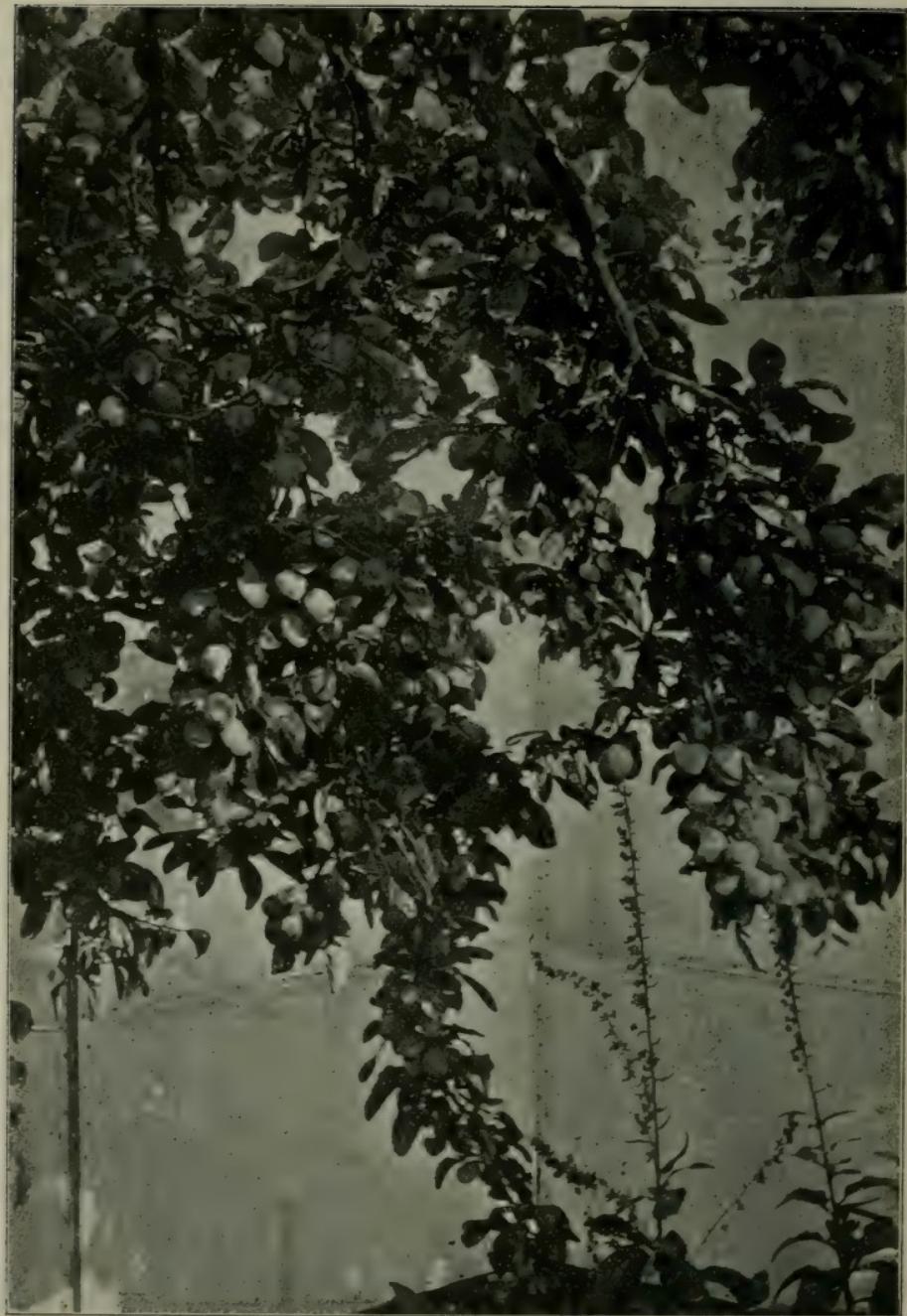
Peach trees and Nectarines require a considerable amount of disbudding at the commencement of their season of growth. If they are neglected in that respect at that period it will be at the ultimate cost of the fruit and the welfare of the tree.

Very soon after the flowering period the young growth will be sufficiently advanced for being easily rubbed out with finger and thumb. Nearly the whole of the incipient growth will have to be removed; but its removal will be better effected in two operations. At the first operation remove all the growing wood buds which are at the *back and front* of the young branches, and disbud the whole of the tree in this way. The second disbudding should be done after a lapse of four

or five days—according to atmospheric conditions and the condition of the tree—when nearly all the wood buds on the lower side of the young branches should be removed. Then of those on the upper side of the branches the best and most suitably-placed wood-bud near the base should be retained to develop into a fruit-bearing branch for use the following year. The bud at the point of the young branch should be allowed to grow to the extent of three or four leaves and then have the point pinched off; but if it is desired to extend that branch in the same direction, the terminal shoot must not be pinched. The remainder of the surplus wood growths may now be easily disposed of. Wherever there is a peach to be nourished, *there must there be leaves to provide the nourishment.* Those leaves must be on the branch at a point where the fruit will be between the leaves and the main branch or stem of the tree. In other words, in order that the fruit may be nourished, the sap must reach and pass the fruit and continue its progress into the leaves and back again. A fruit cannot be perfect—but is probably worthless—if there are no leaves to attract the sap beyond it, and to transform the crude sap (raw material) into the perfect material under the influence of light and air.

Apricots should also receive attention. A modified form of the procedure recommended for Peaches will meet all requirements of trained trees of the Apple, Pear, Plum, Sweet Cherry, and Apricot.

Vines usually produce several laterals from each strong spur; all of these should be removed but one, which should be the best and most rightly-placed lateral. But sometimes there is a space too large and which must be filled, when two laterals would be left; one to grow in the normal direction, the other to be trained into the vacant place.



Branches of Plum, 'Prince Engelbert,' in Experimental Garden,
Droitwich 1907.

When disbudding is regularly and efficiently performed, it at once economises and promotes the best powers of the tree and reduces all subsequent pruning to a minimum.

SUMMER-PRUNING.

“Prevention is better than cure” is an established maxim in nearly all affairs of human life, and is the cause of the disappearance of many evils therefrom. So it is with vegetable life, whether high or lowly in form. The act of summer-pruning is one—an important one—of various means by which the intelligent gardener endeavours to attain certain definite ends; and in the case of Fruit trees those ends are the production of more and better fruit.

Summer-pruning is the natural sequence of disbudding, and is quite as necessary, if not more necessary, to trees whose extension or growth has to be restricted.

One Vine would quickly fill a huge Vinery if it were not severely winter-pruned and summer-pruned; and one Peach tree will soon fill the back or the front of a fair-sized Peach house if it be not pruned in winter and pruned in summer, or disbudded, or stopped or pinched. In other words, experience has taught that a high standard of quality and quantity of fruit from trees restricted or limited in their dimensions, can best be obtained by well-considered winter and summer-pruning, supplemented by careful thinning, disbudding, and “stopping,” or pinching out the *point* of a young shoot after it has formed several leaves or extended two inches or thereabouts. This system is not only adapted for, but is essential to complete success in the cultivation of first-class Grapes, Peaches, Nectarines, Melons, Pears, Apples and Plums, especially for the three last-named kinds of hardy fruit when grown as single or double-cordons and espalier or palmette-verrier.

Restricted trees derive much more benefit from early summer-pruning than from late summer-pruning, because the sunlight is more potent for good results from the middle of June to the middle of August than after the latter period, consequently the manufacturing cells of each leaf which receives unobstructed sunlight are enabled to manufacture more wood and better wood, that is—healthier wood and more fruitful wood. Hence the practice of disbudding as soon as surplus young shoots can be rubbed out with the fingers; and the young shoots which are to remain to form fruit-spurs may with advantage have their points pinched out by finger and thumb.

The prevention of overcrowding, to the exclusion of light and air, is far more valuable for obtaining much fruit and well-coloured fruit than is the too common practice of allowing a mass of long shoots to smother the leaves near the base, and then to cut them all back at the end of August and in September, to the exposure of a large percentage of yellow leaves whose cells have ceased work, and leaves yellow and green whose cells are ceasing work; in such cases it is all too late and futile for that season in any case. Hence it is clear that the growth of fruit under these conditions entails a large expenditure of time, and therefore is expensive; consequently this finer and better fruit *ought* to receive the best prices in the market.

We thus see that if *disbudding* and *pinching* be systematically and properly carried out there will be little summer-pruning to be done. But in few gardens is there time to treat in this way all the trees which ought to receive the foregoing treatment; therefore the pruning in its objectionable form has to be practised in order to prevent the trees from becoming unmanageable. In such case, perhaps, the following modus operandi may be found helpful:—

The best time for commencing to summer-prune is as soon as the young side shoots have produced four or five leaves, it is then tender, and the point of the growth can be removed by means of the finger and thumb, leaving three or four good leaves, and as many should be left at the first pruning in every instance. Any growth subsequently developing the same season from where the shoot had been previously cut back may be cut back to *one* leaf; the object being to keep the buds in the axils of the two or three lower leaves from starting into growth. This treatment applies to cordon, espalier, pyramidal, bush, or wall trees of the Apple, Pear, Plum, Apricot or Cherry. The spurs should be periodically thinned out to *not less* than six inches apart and very rarely—if ever—more than nine inches apart.

RED, WHITE AND PINK CURRENTS.

are also better for being summer-pruned. The young shoots on the main branches should be pruned back to about four leaves. But if the tree is not fully grown the leading shoots ought to be either left un-pruned or pruned very slightly. June is a suitable time for the operation and it should not be omitted; it will be better to do the work later than not to do it at all.

THE GOOSEBERRY.

Gooseberries, when trained to wires or trellis, should also be pruned in summer, in the same manner as Currants. When the tree is young and vigorous probably it will require to be pruned several times during the season; in which case *one* leaf should be left beyond the previous point of summer-pruning; the additional leaf to be left at each pruning; but should the last pruning take place at the end of the season of growth, then instead of leaving an additional leaf, the pruning may rightly be more severe, and the cut may be made at the third or fourth leaf from the base of the primary growth, i.e., the growth first made earlier in the season.

CHAPTER VII.

THE PRUNING OF ROSES.

MANY Rose trees are annually relieved of all their flowers by the unconscious hand of the pruner.

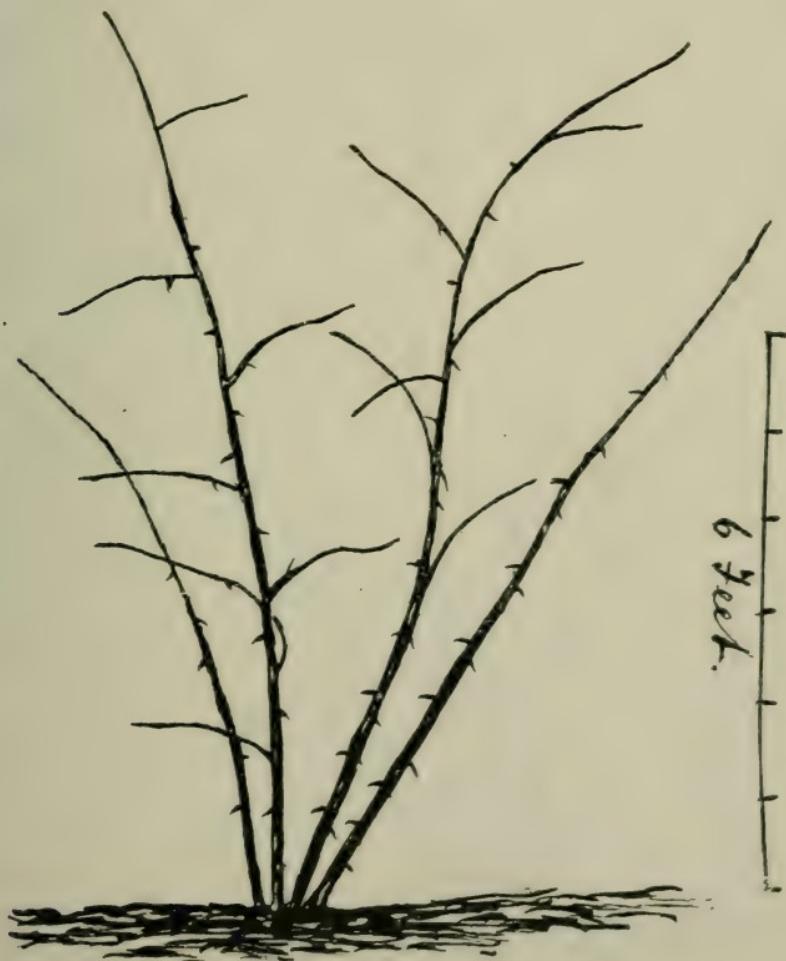
All Roses are to him alike, and he treats them similarly in the matter of pruning. Banksian Roses are pruned as severely as Hybrid Perpetual and Hybrid Chinese as though they were Dwarf Tea Roses. Hence their proprietors patiently wait a number of years for the golden or snow-like harvest of the yellow or white Banksian, and for the huge wreaths of delicate pink Juno or Coup de Hèbé, and are annually disappointed.

A simple rule may suffice for the general guidance of those desirous of obtaining from their roses the whole of the wealth of beauty they are capable of producing, viz.: Prune strong growing varieties, or those which have made strong growth—say, six feet and more in length—very little; and prune weak growth rather severely. In each case the dead and exhausted wood should be always cut out.

But the majority of the lovers of “The Queen of Flowers” desire more detailed information about her requirements, especially in regard to pruning; and it is hoped the following hints may be helpful to all who cultivate this most lovely flower.

The following Roses, and others of similar habit of growth—long and vigorous shoots (with branchlets), from six to ten or twelve feet in length, of one year’s production—should first be cleared of all dead or dying

wood; then remove the exhausted and rather old wood, viz.: branches that have produced their harvest of glorious blossom in previous years and have become somewhat feeble. Finally cut out any wood which is too weak to produce flowers, and the unripened extremities of the remaining good wood. The Rose tree will then have an appearance somewhat like the illustrations on pages 103 and 104, and the following are representatives of the type:—



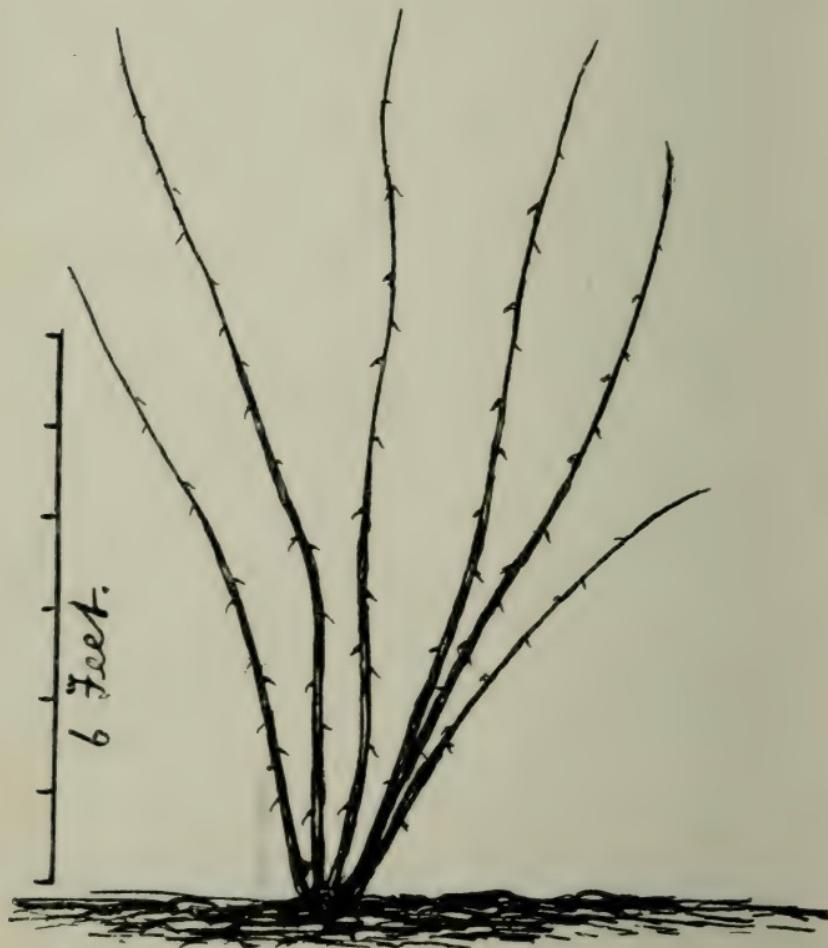
HYBRID CHINESE:

Chenedoile, Crimson Rambler, Juno, Blairii,
Dorothy Perkins.

Wichuriana Roses.

HYBRID BOURBON:

Charles Lawson, Coupe de Hèbè.
Ayrshire Roses. Banksian Roses.

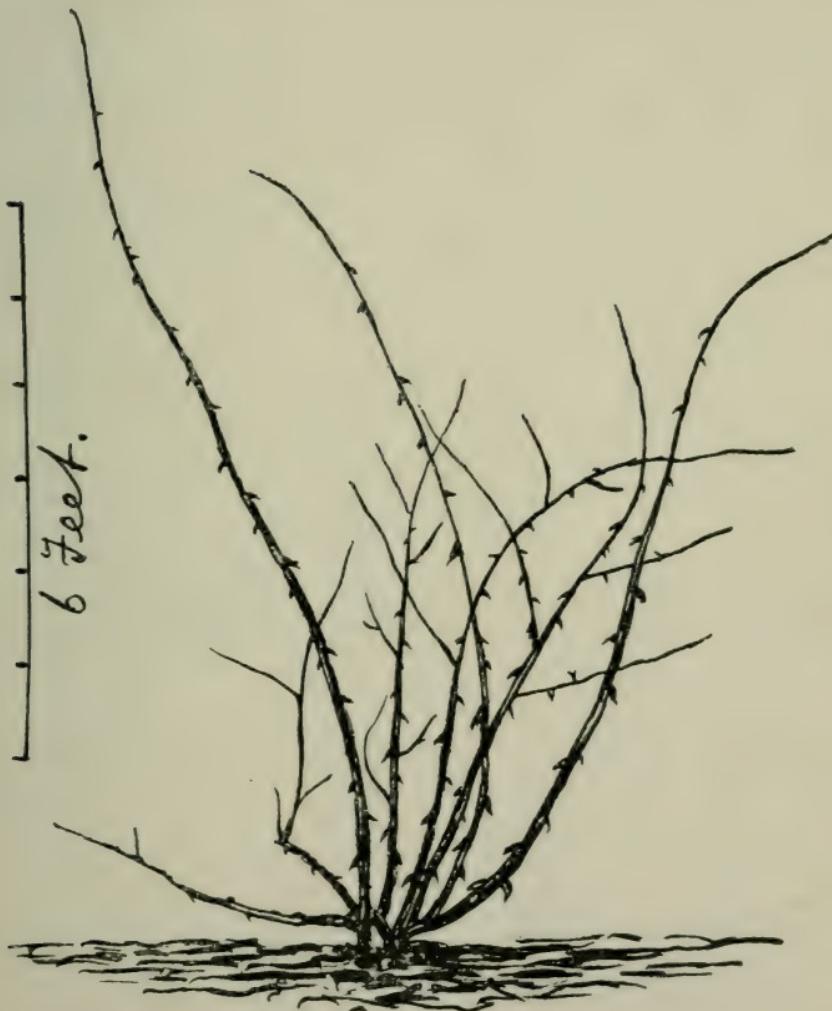


EVERGREEN ROSES:

Félicité perpétue, Flora, Rampant, Williams' Ever-green.

CLUSTER ROSES:

Multiflora, Fragrans, and Madame d'Arblay.



Before pruning.

NOISETTE ROSES:

Aimée Vibert, Celine Forestier, Lamarque, Solferre.

Strong growing varieties of Tea-scented and Hybrid Tea-scented should be pruned very similarly to the preceding classes and varieties mentioned; with the difference that the wood that is to produce the crop of flowers may be cut a little shorter as shewn by the two illustrations on pages 105 and 106, which shew Gloire de Dijon (grown in the open air) before and after pruning operation.

The following varieties are usually sufficiently vigorous to be suitably pruned in the manner suggested when grown otherwise than as standards:—



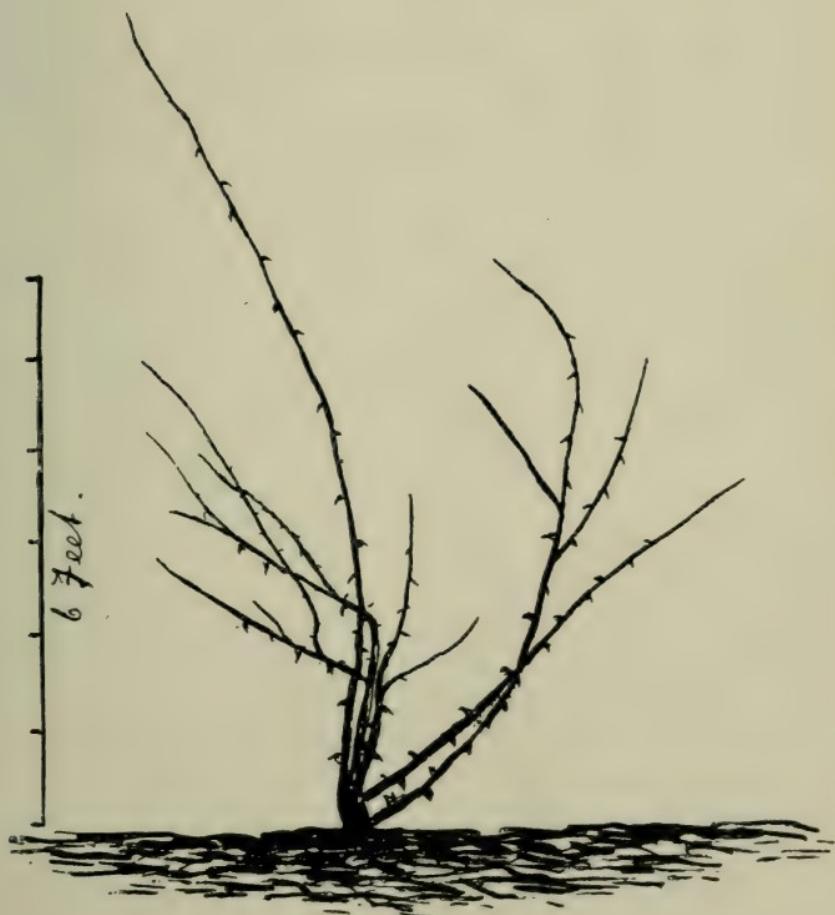
After pruning

TEA-SCENTED ROSES.

Climbing Perle des Jardines, Devoniensis, Fortune's Yellow, Gloire de Dijon, Kaiserin Friedrich, La Boule d'Or, Madame Berard, Maréchal Niel, Waltham Climbers.

HYBRID TEA-SCENTED ROSES.

Cheshunt Hybrid and Reine Marie Henriette.



Before pruning.

The other vigorous varieties of Tea-scented and Hybrid Tea-scented Roses ought to be pruned rather more severely, as suggested by two illustrations, on pages 107 and 108, which shew a Rose tree before and after pruning. The shoots that are three or four feet in length after they have been properly pruned, ought to be pegged down to a nearly horizontal position if they are not trained to any support, such as wall, wire, or trellis.

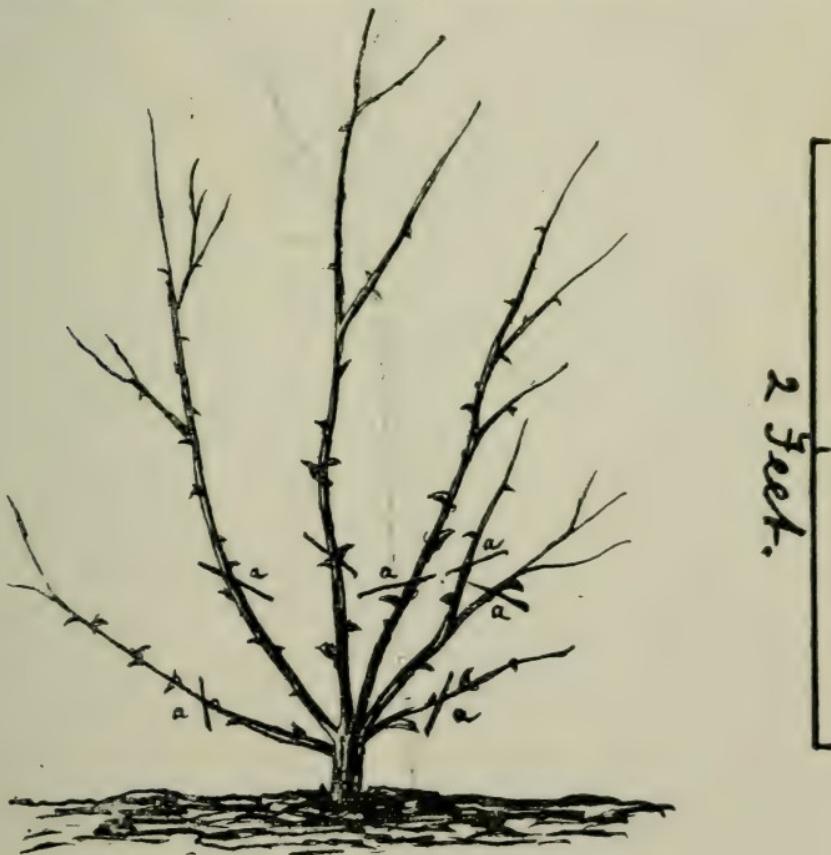
Weaker growing varieties should be severely pruned, as shown by illustration on page 109, where the branches should be cut at the short cross lines marked *a*.



After pruning.

HYBRID PERPETUAL ROSES.

Seldom are Hybrid Perpetual Roses sufficiently pruned; because the operator fails to realise the power this section of Roses have to produce healthy growth and fine flowers as the result of such bold pruning. Too frequently there is great timidity felt in the performance of the operation, and a redundancy of old wood is allowed to remain. This leads to the production of a large number of comparatively weak branches, which in their turn produce weaker branches; and in due time the Rose trees so treated become very unsatisfactory.



Dwarf Tea Rose.

Some varieties wear out more quickly than others; and upon poor and dry soils only the most robust varieties will be satisfactory for any length of time. Hence, there is always a wearing-out process going on; and though good and careful pruning will retard that process, it will not entirely prevent it. Any treatment that promotes healthy growth, also prolongs the life of a Rose tree. Correct pruning promotes healthy growth, and therefore prolongs life.

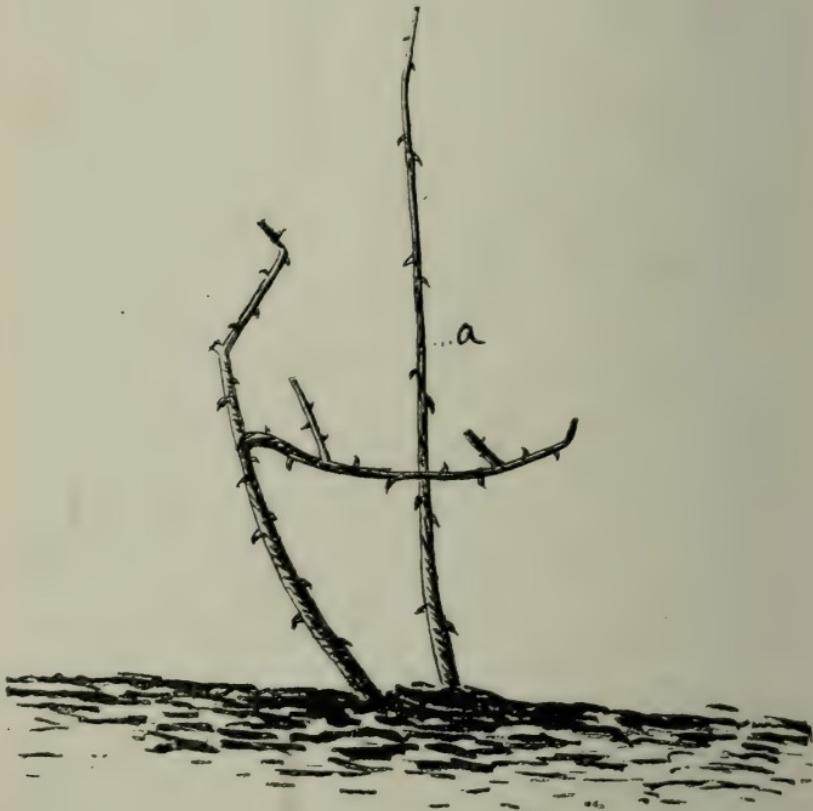


There is a good rule known to rosarians which says:—"All growth over two years old should be cut out." That rule particularly applies to Hybrid Perpetual Roses; and it applies to the majority of kinds of Roses. Therefore, in pruning Hybrid Perpetual Roses, first cut out all dead and old wood—especially of Dwarf Roses. Then cut out all weak and worthless young wood. Finally shorten the remaining healthy growth to two buds on standard trees (see illustration on page 110): and



Before pruning.

in regard to dwarf trees prune severely; but leave very strong growth longer, and peg it down, the shoot marked *a* in the illustration (page 112) would be pegged down. If the pruner will carefully and intelligently read the foregoing hints and give observant attention to the apparent requirements of each tree before he commences to prune he (or she) will have cause for pride in the beauty of his trees.



After pruning.



Photograph of Grapes (Gamay Noir) growing in the open ground in the Experimental Garden, Droitwich, in the year 1905.

CHAPTER VIII.

FLOWERING TREES AND SHRUBS.

A FEW words about pruning Trees and Shrubs which are grown chiefly for their more or less beautiful flowers may serve as a fitting conclusion to this treatise on pruning; and a list of some kinds of shrubs requiring different times and methods of pruning may be of service to readers.

Many plants do not flower, or produce flowers unsatisfactory in quantity and quality, as the direct result of improper pruning. In the majority of cases the flower-producing portion of the plant will have been removed from the plant by the operation of pruning. For example: the charming *clematis montana*, which is so beautiful when laden with snow-white flowers in spring, is sometimes rendered uninteresting and disappointing through an untimely pruning operation. The plant should be pruned—if it be pruned at all—immediately after flowering, and not during the autumn or winter, or any time before its flowering period. The same remarks apply to the well-known Flowering Currants (*Ribes*), Guelder Rose (*Viburnum*), Deutzia, *Prunus*, Yellow Jassamine (*Jasminum nudiflorum*), Allspice (*Calycanthus*), and other shrubs and trailing or climbing plants.

The important point to remember in pruning such plants is that there are two great groups:—Those flowering in spring on mature wood and from buds formed during the previous season of growth, as in the case of

those plants just mentioned; and those flowering in summer or autumn upon growth of the current season. Professor Bailey says:—"The methods of pruning to produce a given form of bush are the same in either case; but if it is desired to head-in and yet not sacrifice the bloom, the early-flowering shrubs should be cut back just after blooming, rather than in winter and the summer-flowering kinds in winter (or when the plants are dormant)." The latter pruning applies to the Kerria (*Corchorus*), Privet (*Ligustrum*), Bladder-nut (*Colutea*), and Hydrangea.

M. Baltet gives the following tables:—

SMALL TREES AND FLOWERING SHRUBS.

Prune in Winter when plants are dormant.

Abelia	Clethra	Lonicera
Actinidia	Colutea	Lycium
Amorpha	Cornus	Myrtus
Baccharis	Hibiscus Syriacus	Nerium
Bignonia	Hydrangea (American species)	Philadelphus
Buddleia	Hydrangea paniculata	Rhus
Callicarpa		Rosa
Camellia	Hypericum	Rubus
Cassia	Indigofera	Solanum
Ceanothus	Kerria	Symporicarpus
Clematis (sections Flamula, Viticella, Jackmanni, and Lanuginosa)	Lagerstroemia	Tamarix
	Leycesteria	Viburnum Tinus
	Ligustrum	Vitex

SPRING FLOWERING SHRUBS.

Prune immediately after blooming, or when in leaf

Amelanchier	Deutzia	Ribes
Amygdalus	Exochorda	Rosmarinus
Arbutus	Forsythia	Sambucus
Calycanthus	Hydrangea (Asiatic)	Syringa (Lilac)
Cerasus	Jasminum	Tamarix Gallica
Cercis	nudiflorum	Tamarix
Choisya	Malus	Africanus
Cistus	Olearia	Viburnum (French and Asiatic)
Coronilla	Paeonia Moutan	
Crataegus	Persica vulgaris	Weigela
oxyacantha	Phlomis	Wistaria
Cytisus	Prunus	

SHRUBS NOT REQUIRING PRUNING, BUT
SIMPLY REMOVAL OF OLD WOOD.

SPRING-BLOOMING.

Akebia	Crataegus	Lonicera
Andromeda	Pyracantha	Tartarica
Azalea	Cytisus	Magnolia
Berberis	Laburnum	Mahonia
Calophaca	Daphne	Rhododendron
Caragana	Fraxinus Ornus	Skimmia
Cerasus	Halesia	Staphylea
lauocerasus	Kalmia	Viburnum (Ameri- can species)
Chionanthus	Koelreuteria	Xanthoceras
Cotoneaster		

SUMMER-BLOOMING.

Aralia	Cladrastis	Robina Pseudo-
Artemesia	Pavia (except Cali- fornia)	Acacia Yucca

LARGE FLOWERING TREES NOT REQUIRING PRUNING.

<i>Æsculus</i>	(Horse Chestnut)	<i>Paulownia</i>	<i>Pyrus</i>	<i>Aria</i>	(White Beam Tree)	<i>Robinia</i> (with exceptions)
<i>Catalpa</i>						<i>Sophora</i>
<i>Liriodendron</i>						<i>Sorbus</i>
		<i>Tulipifera</i>				

PRUNING THE SPIREAS.

SPIREAS BLOOMING IN THE SPRING.

These ought not to be cut in winter, but when the season of bloom in past, cutting shortest the most vigorous subjects.

<i>Chamædrifolia</i>	<i>Prunifolia</i> .	In summer pinch the side shoots.	<i>Argentea</i>
<i>Hypericifolia</i> .	Cut to medium length.		<i>Lanceolata</i> or <i>Reevesii</i> . These should be slightly shortened.
<i>Opulifolia</i> .	Top the long shoots.	<i>Van Houttei</i> . Cut away one half the branches which have bloomed.	<i>Thunbergii</i> . These require very little pruning.
<i>Ulmifolia</i> .	Cut away half the shoot.		

SPIREAS BLOOMING IN SUMMER OR AUTUMN.

Prune in Winter.

<i>Ariaefolia</i>	<i>Fontenaysii</i>	<i>Nobleana</i>
<i>Billardi</i>	<i>Bumalda</i>	<i>Salicifolia</i>
<i>Douglasi</i>	<i>Fortunei</i>	<i>Sorbifolia</i>
<i>Corymbosa</i>	<i>Lindleyi</i>	

All the Fortune Spireas should be cut about half length.

Bumalda should have the ends of the shoots removed in winter.

Lindleyi should be severely pruned, even down to the ground.

The Spireas whose branches are compact ought to be thinned and pruned.

CHAPTER IX.

GRAFTING.

REASONS FOR GRAFTING.

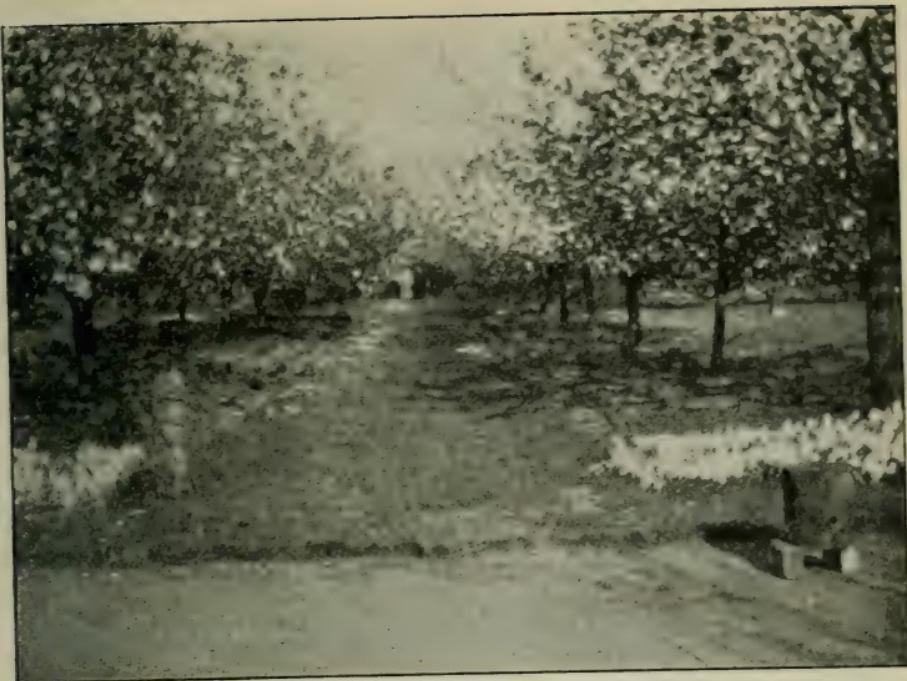
THE operation of grafting is for the increase and perpetuation of varieties; for replacing a poor variety by a good one; to restore a defective or exhausted tree; and to convert an unfruitful tree into a fruitful one.

Grafting differs from budding, in that branches are used of one or more year's growth, while the buds are in a dormant state. Budding is nearly always done with buds of the current year's growth in an active condition. But it is equally important that the sap be flowing in the stocks for grafting and for budding.

Grafting in the open air may be practised from the time the buds shew signs of activity in spring until about midsummer. Grafting under glass is constantly practised from January to March, and from July to September.

Those kinds of fruit which first commence to grow in spring are generally first ready for grafting.

Cherries, Peaches, Plums, Pears, and Apples, generally require to be grafted in the order given; but some varieties of each kind have to be grafted earlier than others of the same kind.



Avenue of Half-Standard Apple Trees, Experimental Garden, Droitwich.



Avenue of Bush Trees in Experimental Garden, Droitwich.

CONDITIONS OF SUCCESS IN GRAFTING.

The success of the operation greatly depends upon the preparation of both scion and stock, both of which must possess the elaborated sap that was stored up in them during the previous season.

The stocks should be beheaded at the end of January in mild seasons; or as soon after as frosts will permit in severe winters, before the sap is moving; and it is equally important that the scions be secured by the same time. Grafting has sometimes succeeded when neither stock nor scion have been previously prepared; but only by chance does it succeed. To ensure success every scion or graft should be cut when the buds are quite dormant, and they should be preserved in that condition until the time for grafting. To do this they should be buried three parts their depth in moist soil or sand on the north side of a wall, or in some similar position until required for use. Even in that position it is sometimes necessary to pull them up from the moist soil and expose them to the air for a few days, in an exceptionally mild winter, to arrest the movement of the sap.

Young stocks (two or three years old from seed or sucker) ought to have the tops and all branches removed, cutting the whole stock about half down, or within six or eight inches of the soil.

Mature trees should have their branches cut back from three to six feet from the trunk; always allowing for the removal of another piece of the branch at the time of grafting. The junction is not quite so good when

stocks are headed back at the time of grafting when the sap is in motion; and gumming in such cases is almost sure to follow in the case of stone fruit.

April is generally the best month for young stocks: and May for trees that have been headed back, if both have been prepared as advised; but it is better to be a little late than too early.

IMPLEMENTS, Etc.

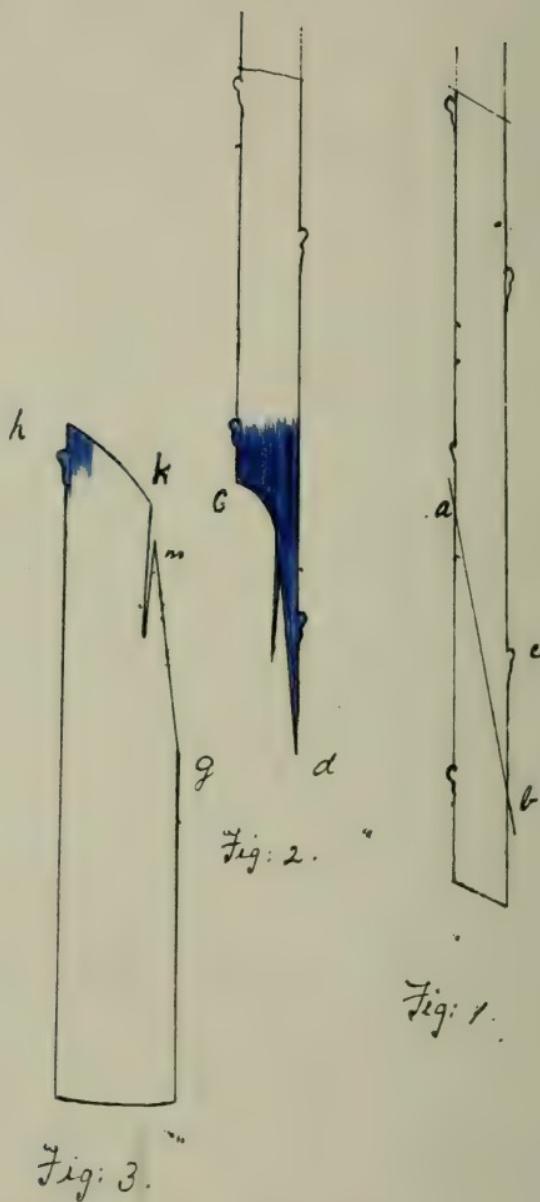
WAX AND TYING MATERIAL.

Have stocks and grafts in readiness and a strong knife for beheading the young stocks, also a smaller one with a narrow blade; saws, chisels, mallet, raffia, matting, woollen thread for young stocks, and soft string for the old trees; also grafting wax or clay.

The French cold grafting wax called Mastic l'Honme-Lefort, is the most convenient. This may be obtained from most seedsmen.

A good cold wax can be made from two parts burgundy pitch, to one part spirits of wine, alcohol 98 per cent. Dissolve the wax in a saucepan over a slow fire, then gradually pour in the spirits of wine and boil together for about two minutes, stirring briskly all the time. To be used when cold and applied with a small brush. This we have made and used in the Experimental Garden and elsewhere.

Clay is preferred by some persons who think it keeps the scion cooler than wax. The clay should be obtained a fortnight before it is required for use, and be thoroughly moistened and beat up like mortar; this



TONGUE-GRAFTING.

ought to be repeated daily. A day or two before it is required for use, mix with it one-third cow manure, and nearly the same amount of hay cut into about three-inch lengths; old haybands answer for the purpose very well. These ingredients prevent the clay drying and cracking.

The tree to be grafted is called the stock, and the part that is grafted on the stock is called the scion.

AFFINITY, AND MUTUAL VIGOUR OF PARTS.

It is very important to choose the stock that is most suitable for the kind of tree, or the variety, that is to be grafted upon it.

The Plum stock is most suitable for Plums, Peaches, Nectarines, and Apricots. The Peach and Apricot are grafted on each other with difficulty. Kinds to be grafted must be of the same botanic family.

Stocks raised from seed are frequently much better than those raised from suckers, because the latter are usually very troublesome by throwing up suckers, to the detriment of the tree, and of the cultivator. Pears for standards are best grafted on the Pear stock. Pears for pyramids and bushes should be grafted on the quince stock, which is raised from seed, because their growth is moderated thereby and they make more compact trees; they also become fruitful at an earlier stage. These are specially suitable for shallow soils, and for heavy and cold soils.

Apples for standards are grafted on stocks raised from seeds—Apple or Crab.

Apples for pyramids, cordons, bushes, and espaliers are usually grafted on stocks raised from layers and cuttings of the Paradise stock. There are some

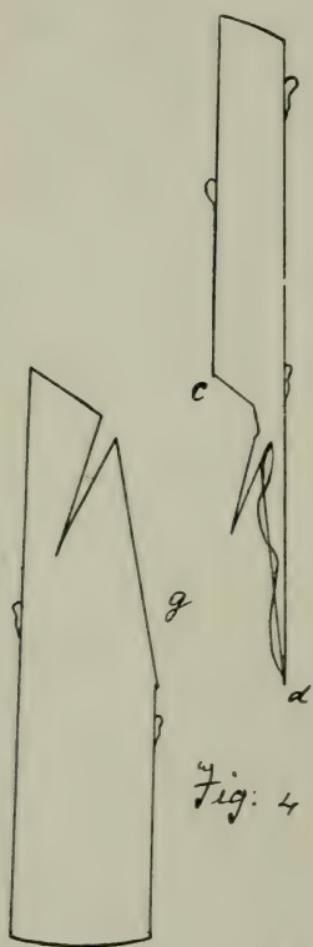


Fig. 4

Fig. 5

TONGUE-GRAFTING.

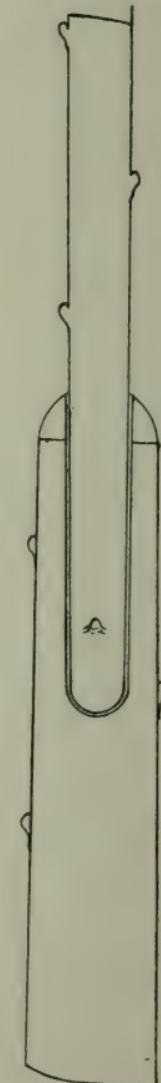


Fig. 6

varieties very successful on "free" stocks. Stirling Castle and Lane's Prince for example.

Strong growing varieties like Bramley's Seedling, Blenheim Pippin, and Warner's King should be chosen for grafting upon large trees that have been beheaded, because these make better heads, soon become fruitful when grafted on large trees, and are likely to be more enduring than weaker-growing varieties; but it must be remembered that Warner's King is very liable to the disease known as "canker."

CHAPTER X.

METHODS OF GRAFTING :

TONGUE GRAFTING, OR WHIP GRAFTING.

TONGUE grafting is best used on stocks about the size of a man's finger. In this style of grafting we first take a one-year-old and mature shoot (figure 1), and selecting a place just below a bud, as at *a*, draw the knife with one clean sweep and bring it out at *b*. It is important to have a bud just above the cut, and one on the other side, as at *c*. The bud above the cut helps to draw the sap to heal the crown of the stock when the graft is growing, and the one at the back, as *c*, will often grow and form a tree when the top has been broken off by some accident. Next proceed to cut out the curve as shown at *c* (figure 2), taking out all the pith, and cutting down with a straight slope from the curve to the lowest point at *d*. If we now look at figure 4 we see a similar shoot, but which has a straight cut at *c*, instead of a curved one. This is given to show how the work should *not* be done, because the straight cut weakens the shoot more than the curved one does, and is frequently the cause of the shoot being broken by a slight knock or by a bird settling on it. It will also be observed that the tongue is cut out much deeper, which weakens the graft behind it. Again, the cut leading from the tongue to *d*, is very uneven, instead of being

cut to the straight line which is drawn through it. This is just how a learner makes his cuts, and it can at once be seen how impossible it would be for this to fit perfectly level on such a straight line as shewn at *g* (figure 5).

The scion being now ready, the stock should be prepared for its reception. Select a smooth clean place from four to six inches above the soil and proceed to behead the stock, bringing the knife out just above a bud, as shewn at *h* (figure 3). This bud is important, because its mission is to draw up the sap to keep alive the wood behind the scion until it has healed over and become joined to the stock, but this bud should only be permitted to grow two or three leaves, when the point should be removed. The top should be slightly rounded off with a curve from *k* to *h* to correspond with the curve in figure 2 at *c*.

We now measure the cut from *c* to *d* (figure 2), by placing it against the stock and then cutting from *g* to *k* in figure 3 the same length. The knife should enter at *g* and come out at *k*, removing only a thin slice of wood and bark. Now place the prepared part of the scion (figure 2) on to the cut made from *g* to *k* (figure 3), and it should fit exactly, as shewn in figure 6, with a narrow space of the outer bark showing all round the scion in nearly all cases.

Figure 6a. shews the inside parts of both scion both and *d* is the bark, shewn also in both scion and stock. *C* is the wood, which is the same size in stock; but it is very much wider in the stock than in the scion, owing to the stock being two or three years older than the scion; it being very important that the

inner edges of the inner bark should meet, because that is the only place where the stocks can unite. If by any chance the inner bark of the scion and stock cannot meet on both sides be sure to have them to perfectly meet on one side.

A (figure 6a) shews the lower extremity of the wood in both, at a point where each should meet, and the scion must not in any case come below this point;

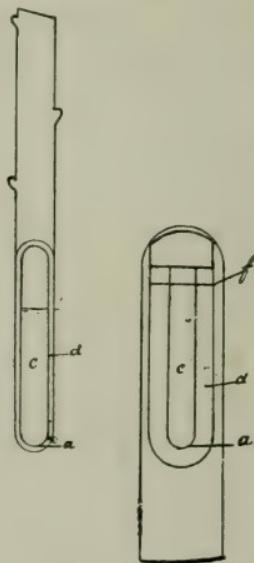


Fig: 6 a

TONGUE-GRAFTING.

it would be better to be a little above than to be below. F shews the tongue on the scion, and the place cut for its reception on the stock.

After the scion and stock (figures 2 and 3) have been made to fit well together, a thin slice of wood should be cut to form a tongue, as shewn at e, figure 2, and a

corresponding incision in the stock to receive the tongue as shewn at *m* (figure 3). A thin slice only in each case should be cut, because wide cuts weaken both scion and stock; and they also cause a bulging, which frequently prevents the scion and stock meeting close together. The tongue should be made to exactly fit, in order to hold the scion in its place until it has been securely tied with matting or other kind of ligature. The two (scion and stock) should then be bound firmly together to hold them in their proper position; but not so firmly as to prevent the movement of sap under the bark, or the result may be a failure. The whole of the junction should then be covered with grafting wax, or clay; and the labels securely attached on the stock below the graft.

SADDLE GRAFTING.

Stocks from the size of one's thumb to that of a broom handle are the most suitable for saddle grafting (or what is a modification of saddle grafting), which is the system much favoured in Worcestershire.

Figure 7 shews the system with the scion and stock cut and fitted; thus slightly raised above the stock to shew how each are cut and fitted together—the base of the scion being drawn too large.

Figure 8 shews the scion in readiness. The knife first enters at *a*, and a thin slice is cut up to *b*; the blade is then turned across towards *d*, and the whole of the centre wood (including all the pithy part) is removed from the angle *d* down to *c*, taking care to finish with a straight and smooth cut from *d* down to *c*. The lip from *a* to *b* must be cut very thinly, so that it can be bent over

the top of the stock, as shewn in figure 7, without breaking. Now place the scion by the side of the stock and take the measurement of the cuts to be made to receive

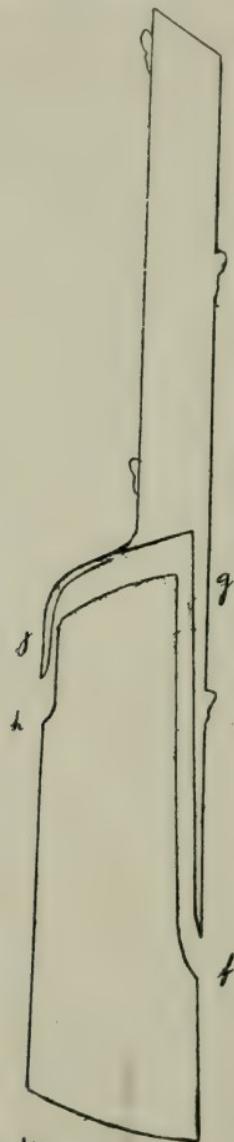


Fig: 7

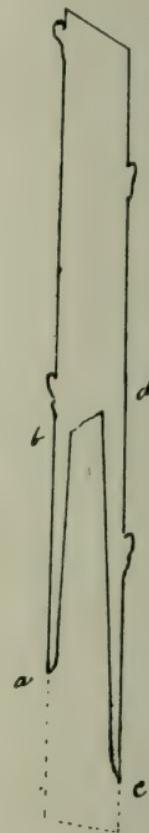


Fig: 8

the lip from *a* to *b* and from *c* to *d*, then cut them accordingly, as shewn in figure 7, from *f* to *g* and from *h* to *j*. Fit together and bind safely, taking care that the inner bark of both scion and stock meet together.

The advantage of this system is that the scion unites to both sides of the stock, and is not nearly so easily broken or displaced, and the cut surface of the stock is much more quickly healed over. Grafting wax or clay must be used to cover every part of the junction.

When the young shoots on the grafts have grown about six inches the wax or clay should be removed and the matting untied; then they should be re-tied with fresh matting, taking care not to tie it too tightly. Fix a stick in the ground and tie to the stick the stock below the graft, and the scion above it, to prevent the wind from blowing them out or breaking them. The best way of removing the clay is to hold a brick, or half a brick, to one side of the clay and strike the opposite side with a hammer, when it may be taken away without injuring the growing scion. The clay and wax are often left on until worn away, but this is a mistake, because the matting under it is sure to be cutting into the wood and doing serious injury long before it is broken by the expansion of the wood.

When large trees are beheaded the branches are often too large for either of the previously described systems of grafting, but they may either be Cleft-grafted. Knotch-grafted, or Crown-grafted; the latter is sometimes termed Rind-grafting.

CLEFT-GRAFTING.

In Cleft-Grafting the top of the branch is split across with a hammer and chisel. A wedge is then driven into the centre of the crack to keep it open while a scion is placed on each side, which should exactly touch the inner marks of scion and stock. The wedge is then carefully withdrawn, and the scions are held tightly in their position. We do not recommend this system, because the crack often becomes a harbour for insect pests and fungus, and decay often there commences

NOTCH-GRAFTING.

Figure 9 is a branch in section, with sections of scions fitted into the stock. *A* shews a scion very much too large; *c* is too small; *b* is better, but is too large; the inner barks do not meet. *D* is properly fitted, the inner bark of scion and stock meet together. We now turn to the scions; figure 10 shews a badly cut scion, which might probably fit like either *a* or *b* figure 9. Figure 11 shews a back view of a properly cut scion; and figure 12 a side view of the same;. These are best fitted into the stock by first making a cut with a widely set saw, then paring the rough sides of the cut with a sharp knife until the notch is somewhat V-shaped, but not very much so, because the scion will scarcely be fixed tightly in an equilateral triangle. Take care not to cut the edge of the bark away more than the wood. The scion should be carefully fitted, then driven down with a small mallet into its place, as shewn at *d* figure 9, and should fit so tightly that it cannot be easily pulled out. It should now be tied round with soft string to keep the

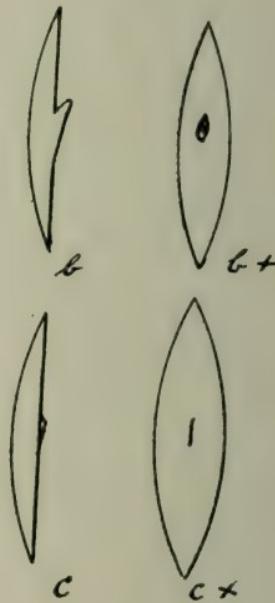
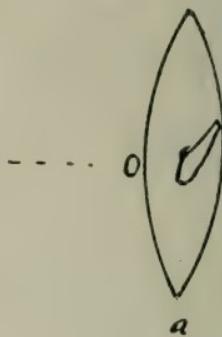
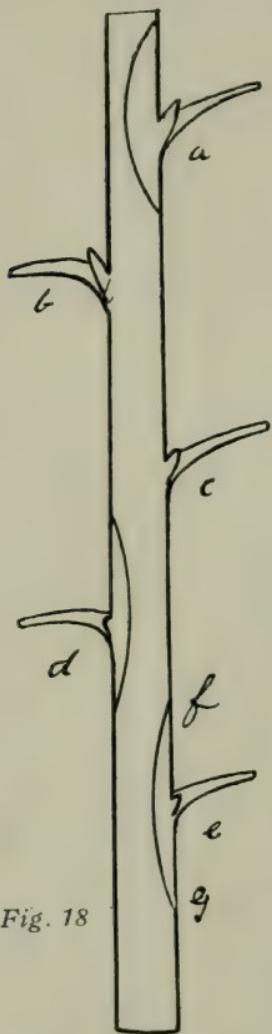
A bud can hardly be too small on a rose shoot that has produced a flower; but it may easily be too large through having grown too much. Figure 18 shews a rose shoot with wood buds in different stages of growth; *a* and *b* are both too forward; *c* is also too forward, but may be used if buds are scarce. *D* and *e* are just right, but buds smaller than these would be better than the buds *a*, *b*, or *c*.

REMOVAL OF THE BUD.

Having selected the most promising shoot, the leaves should all be removed close to the leaf-stalk by a knife, as shewn in figure 18. This is very important because the leaves, if left on, evaporate the moisture and soon cause the bark to shrink. The shoots should also be placed in water if they are not to be used at once, but they will keep an hour without injury if they are not lying in the hot sun or parching winds.

If the reader refers to figure 18 he will see that curved lines are drawn at *a*, *d*, and *e*. *A* shews the curved line drawn more than half-way across the shoot, shewing that the wood is cut too deeply. The curved line at *d* is the right *depth*, but is not long enough *below* the bud. Both these are wrong, and are given for the purpose of shewing how they should *not* be removed. The curve in *e* is the correct one, shewing the bud about half-way between the top and the bottom of the shield, with only a thin slice of bark and wood behind it. The knife should be inserted at *f*, and brought out at *g*, about one-and-a-half inches long. This piece, when cut out, will

be something like *a* in figure 19, or the shape of a shield. This kind of budding is called shield-budding, on account of its shape, and is the method most generally used.



The woody portion must now be taken out, and this is best done by holding the shield by the bud, so that the leaf-stalk is between the finger and thumb of the left hand, and then inserting the point of the knife between

the bark and the wood at the upper part of the shield, and having the tip of the wood between the knife and thumb, now give a sharp pull towards the operator when the wood will easily separate from the bark, leaving the inside of the bark as shewn at *c* \times figure 19, and the wood as represented in a side view at *c* figure 19. But sometimes the wood comes out as shewn in a side view at *b* figure 19, which also leaves a hole in the inside or back of the bud, as shewn in *b* \times . This fault more frequently occurs when the bud is too forward, as shewn at *a* and *b* figure 18. This hole is more likely to be left in when the wood is taken out from the point below the bud instead of from the point above it. It is no use inserting buds that have holes at the back of them as shewn at *b* \times figure 19, because the bud is almost sure to die before any sap can reach it. These holes would first have to be filled with new cells, which are built up one above another somewhat like bricks in a wall, and no sap can reach the bud until the last cell is formed to connect the bud with the flow of sap along the shoot, and by the time this is accomplished the bud is almost sure to have died from starvation. It is better to throw away such buds than to risk the possibility of the growing.

Turning now to the stock to be budded, we select a clean and smooth place as at *a*, figure 20. At this point the knife should be drawn upwards about one and half inches, with just sufficient pressure to only cut through the bark. At the top of this cut a cross cut should be made as at *b*, taking more care that this cut does not penetrate the wood, or the shoot will break off with the first rough wind, which frequently causes the bud to die.

The bark on each side of the first upward cut must now be gently raised by pushing in the point of the ivory handle of the knife, or the blade, so that the lower part of the shield *c* ×, figure 19, can be easily slipped down under the bark through the cross cut *b*, figure 20, as shewn at *a*, figure 21, with the upper part of it standing out above. This is best done by holding the shield in the left hand with the leaf-stalk between the finger and thumb, and holding the corners of the bark open with the knife in the right hand, so that the shield with bud can be slipped down into its place, as shewn at *a*, figure 21. This shield should, if possible, be pushed down so that the line at *a* reaches the cross bar or **T**, where it should then be cut off quite square so that it fits inside the bark. The bud should now be bound in with raffia, matting, worsted, or prepared cotton, and sufficiently tight to press the bud on to the wood, but not so tightly as to stop the circulation of the sap to the bud.

The bud should be inserted as quickly as possible after it has been prepared, in order to prevent the air drying the sap either in the scion or stock.

In dry seasons the buds of some fruit trees come out so badly that it is best to insert the point of the knife between the bark and wood at the side, as shewn at *a* in figure 19, in order to sever the portion of wood that is in the bud so that it remains there when the wood is pulled away. This can best be done when only a narrow piece of wood is left when the shield is first removed from the shoot.

More care is necessary in selecting the buds in fruit trees than in roses. As a rule the buds in the middle of the shoot are more suitable for budding than

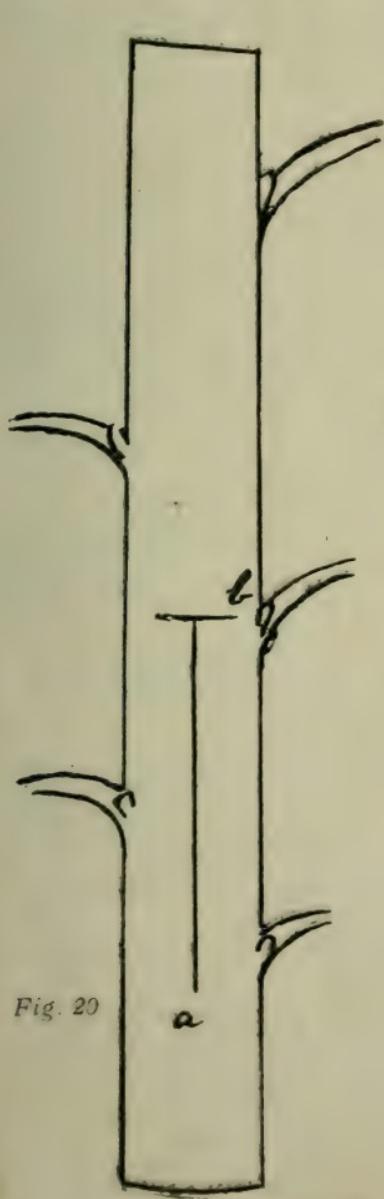


Fig. 20

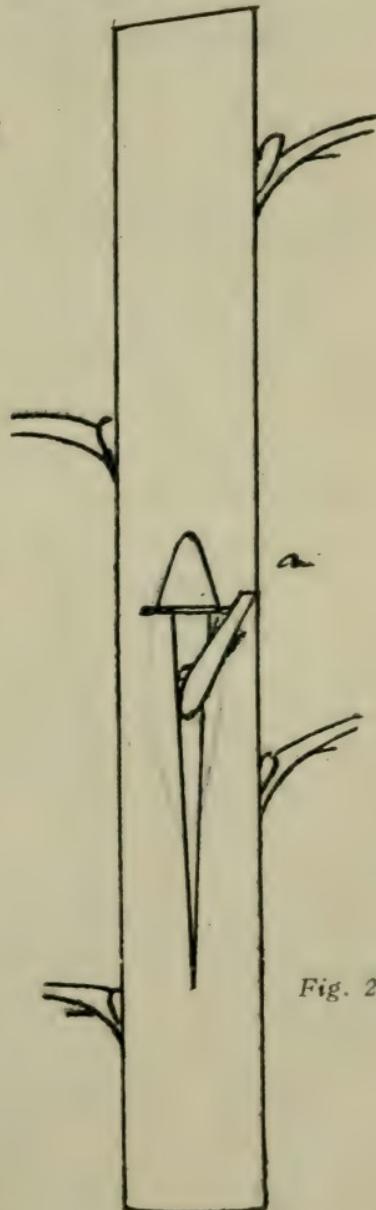


Fig. 21

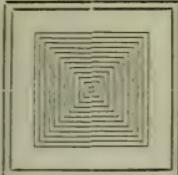
those at the ends; those at the top being immature, and those near the base often too mature. Care must also be taken that they are wood buds and not fruit buds, because so many are fruit buds only. The wood buds are more pointed than the fruit buds, and in some cases are only to be found on the lower parts of the shoots.

None of the leaves, or any part of the shoots, should be cut away from the stock, either before or after budding, until November, at which time the top may be cut back to within three or four inches to the bud. When the bud has grown about an inch long in the spring the wood should be cut back level to it; and when it has grown about six inches long it should be securely tied to a stake to prevent it blowing out.

All plants and varieties should be securely and carefully labelled as soon as they are budded.

M. Charles Baltet in his valuable book on Grafting and Budding mentions the following trees and suitable stocks for the same:—

Tree.		Suitable Stock.
Apricot	—	on the Plum and Damson.
Almond	—	„ Seedling Plum.
Azalea	—	„ Seedling Common Azalea (<i>A.indica</i>).
Camelia	—	„ Single-flowered Camellia.
Cherry	—	„ Seedling Cherry and Mahaleb.
Quince	—	„ Common Quince.
Cotoneaster	—	„ Seedling White Hawthorn.
Medlar	—	„ „ „
Peach	—	Almond, Plum, or Seedling Peach.
Apple	—	Seedling Apple, Doucin, Paradise Stock and Crab.
Plum	—	Seedling Damson, St. Julien, and <i>Prunus domestica</i> .
Rose	—	Dog-briar, Manettii, Monthly Rose.
Rhododendron	—	Seedling Rhododendron Ponticum.



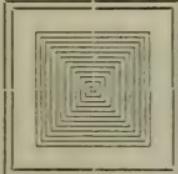
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